SPECIAL EDUCATION

MEETING THE NEEDS

of the

ACOUSTICALLY HANDICAPPED

BULLETIN 421
1944

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF PUBLIC INSTRUCTION
HARRISBURG

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The Purpose of the Hearing Program ***is to Discover*** *Children with Hearing Losses and to Provide Adequate Educational Opportunity for Them*

FOREWORD

THE PURPOSE of this bulletin is to present a complete plan for the detection of school pupils who have hearing impairments and for the provision of the necessary school adjustments which must be made if these children are to be educated properly. The bulletin is written for school administrators, medical examiners, nurses and teachers.

The material covering audiometric equipment and technics is written in terms of the latest approved scientific equipment and the accepted use of it. The importance of following the recommended procedures exactly cannot be emphasized too strongly, since exact use is just as important in obtaining reliable results as is the excellence of the equipment itself. Uniformity in testing technics and in reporting procedures is especially critical in a large program in which many persons will be involved in the interpretation and evaluation of the results.

Special emphasis is placed upon the selection and early adjustment of children with slight handicaps. It is this group for which early medical attention will be most effective in preventing the development of many serious impairments. The Commonwealth and the local districts have made educational provision for children with severe hearing losses through special classes and the residential schools for the deaf. While it is hoped that this bulletin will stimulate further use of these facilities attention is drawn to the much larger group of children whose problems are so frequently unmet—the children whose impairments are not serious enough to warrant special school placement, but which are nevertheless handicapping in the school situation. To enable these children to be educated properly they must be brought to the attention of the classroom teacher whose responsibility it is to make reasonable adjustments for them in the regular school routine. Many of them will need additional special teaching.

The following committee of educators assisted in formulating the organization of the program as it relates to the public schools: Miriam Bell, School Physician, Mt. Lebanon Township Schools; Paul S. Christman, Supervising Principal, Schuylkill Haven Boro Schools; Mildred S. Coyle, Director of School Nursing, Department of Public Instruction; John H. Dyer, Superintendent of the Scranton Public Schools; Ida Finch, School Nurse, Sayre Public Schools; J. Wynn Fredericks, Chief, Division of Health and Physical Education, Department of Public Instruction; John W. German, Chief, Division of School Medical Inspection, Department of Health; J. L. Hinaman, Supervising Principal, Foster Township Schools; Carl G. Leech, Superintendent of the Delaware County Public Schools; S. F. W. Morrison, Superintendent of the Clearfield Public Schools; W. M. Pollard, Superintendent of the Mercer County Public Schools; Rutherford Porter, Supervisor of Special Education for Huntingdon and Blair counties; and C. B. Wilson, State Teachers College, California.

The plan for selection and referral of acoustically handicapped children parallels one which has been drawn up by the Committee of the American Academy of Ophthalmology and Otolaryngology on the Conservation of Hearing. The Department of Public Instruction has maintained an active relationship with that Committee and with its subcommittee for the Commonwealth of Pennsylvania. In writing the bulletin information was drawn from publications and/or conferences with the following individuals and organizations: Lorraine Anson, M.A.; The American Society for the Hard of Hearing; James A. Babbitt, M.D.; Gordon Berry, M.D.; W. D. Chase, M.D.; George M. Coates, M.D.; Warren H. Gardner, Ph.D.; Stacy R. Guild, Ph.D.; Dean Lierle, M.D.; Laila Larson, M.A.; Horace Newhart, M.D.; Douglas MacFarlan, M.D.; Scott Reger, Ph.D.; Eva Thompson, A.B.; and Robert West, Ph.D. Materials and pictures were furnished by the Pennsylvania School for the Deaf. The Department of Public Instruction is especially appreciative of the help received from Walter Hughson, M. D.; Director of the Otological Research Laboratory at Abington, Pennsylvania.

The bulletin was written by Harold Westlake, Ph.D., Adviser in the Division of Special Education, under the direction of T. Ernest Newland, Ph.D., Chief of the Division of Special Education; Leversia L. Powers, Ed.D., Adviser in the Division of Special Education, and Paul L. Cressman, Ed.D., Director of the Bureau of Instruction.

Francis B. Haas

Superintendent of Public Instruction

September 1944

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Meeting the Needs of the Acoustically Handicapped

PART I

SELECTING PUPILS WHO HAVE IMPAIRED HEARING

A. INTRODUCTION

SECTION 1501-A of the School Laws of Pennsylvania provides for the periodic testing of the hearing of public school pupils. The Act is specific in stating that tests of hearing shall be made with audiometers and that the Department of Public Instruction shall prescribe suitable rules and instructions for the administration of these tests.

The proper selection of pupils who have hearing impairments is necessary for many reasons. One of the most urgent reasons lies in the possibility of the prevention of deafness. Medical authorities have repeatedly stated that most of the deafness which is found among adults could have been prevented if it had been discovered in time. It is also stated axiomatically that ear conditions are ordinarily more amenable to treatment during childhood than they are during adult life. Many progressive hearing losses which have their beginnings during the early years can be checked if they are brought to the attention of medical men early enough.

Without detracting from the primary importance of early medical treatment for children with hearing impairments it also can be stated that the educators too have an interest in hearing. Even though there were no medical follow-up of the hearing testing program whatsoever the testing could be justified purely on the basis of its importance in properly educating children. This statement is not made with only the relatively few pupils in mind who should be placed in special classes or residential schools, but rather in terms of the much larger number of children who will continue with their regular classes, but whose efficiency in the schoolroom will be reduced unless they are given reasonable consideration. No one of the special senses is more important to the development of our language functions than hearing, and a child can have no greater handicap in the school situation than a hearing handicap. Furnishing adequate educational opportunities for children with reduced hearing is an important challenge to the school administrator and teacher.

A first step in a program of prevention and educational adjustment must necessarily be a plan for reliably selecting those children whose hearing is reduced. Various methods of doing this are now in use. The whisper or watch tick test is still frequently a part of school health examinations. By the whisper test the examiner estimates hearing efficiency on the basis of the distance from which the subject can hear

the whispered voice. Persons with normal acuity are supposed to hear a whispered voice at twenty feet. Partial hearing is represented as the fraction of twenty feet at which a subject hears a whisper. Such a test cannot be standardized because of the great variation in the loudness and clarity of different individuals' whispered voices. Likewise the watch tick test is based upon the supposition that the person with average hearing acuity will hear the tick of a pocket watch at about five feet. Such tests are entirely out-moded.

The recommendation of the Committee on the Conservation of Hearing of the American Academy of Ophthalmology and Otolaryngology is that the testing of school children be done entirely with audiometers, which is in line with the provisions of Section 1501-A of the School Laws. The audiometer is a precision instrument for measuring hearing acuity, the name being derived from the Latin word "audio," to hear, and the Greek word "metron," to measure. There are two types of audiometers available: the multiple or group audiometer on which up to forty persons can be tested at one time and the discrete frequency or so-called "pure tone audiometer" on which only one person can be tested at a time.

B. A GENERAL DISCUSSION OF TESTING TECHNICS

The Discrete Frequency Audiometer

An audiometer by which pure tones are employed in measuring hearing acuity is frequently referred to as a "pure tone audiometer." The term "discrete frequency audiometer" which is used in this bulletin is more accurate and descriptive, and is in consequence preferred.

The discrete frequency audiometer is essentially an instrument which produces pure tones of different frequency (roughly, pitch). Ordinarily, about eight individual tones are used ranging from sixty-four (64) cycles per second, the lowest tone, to about ten thousand (10,000) cycles per second, the highest tone. The testing tones on the discrete frequency audiometers owned by the Department of Public Instruction at the time of this writing are at 128, 256, 512, 1024, 2048, 4096, 8192 and 9747 cycles per second. Other standard audiometers of different manufacture employ tones very near to these particular ones. The intensity (roughly, loudness) of each of these tones can be controlled.

In measuring the hearing acuity of an individual with the discrete frequency audiometer one finds out just how loud each tone must be before a subject is able to hear it. By comparing the test results of any person with the accepted norm one can readily determine whether the hearing is normal; or if it is below normal, just how much stronger each tone must be for the subject to hear it than for a normal ear to hear it. No other test, whether it be made using the whispered voice, a watch or forks can give as accurate or as complete a measurement of hearing.

The Multiple Audiometer

The multiple audiometer consists essentially of a phonographic record playing unit to which is attached a series of earphones, usually forty

in all. Recordings played on the record playing unit are heard equally well through all receivers. The most frequently used test record is one on which is recorded a voice which pronounces pairs of digits. The intensity of the voice is controlled so that it is easily audible at the beginning of a test, but the intensity is gradually reduced as the test proceeds, until the voice is below the level at which the average ear hears it. The efficiency of the hearing is determined by the lowest level at which an ear hears the digits accurately. Other test records have been developed on which tones of various frequencies have been recorded at different intensities ranging from levels at which they are heard even by persons with moderate hearing losses, to levels where they are heard only by individuals with exceptionally acute hearing. The tone record represents an attempt at a much more exact test than the digit record affords. The digit record is essentially a speech test, measuring the ability to hear blends of all frequencies at once, while the tone test presumes to offer an individual measure of the ability to hear each frequency separately.

A third type of record for the multiple audiometer is manufactured especially for children who cannot write. On this particular record a voice repeats the names of various objects. The children indicate that they hear the voice by selecting the objects named from a series of pictures. They may indicate their choices either by pointing or by making rough marks on the appropriate pictures. As is the case with the digit record, the voice varies in intensity, and the amount of hearing is determined by the lowest sound level of the voice at which the children make correct responses. This last mentioned record is a speech test just as is the digit record. However, it is a more precise speech test in that giving correct responses depends upon an ability to differentiate between consonant sounds rather than between vowels alone. For instance, the ability to discriminate between the spoken numbers "eight" and "five" depends largely upon the heard differences between the vowels "ā" and "ī", while successfully pointing out a picture of a book when there is a choice of pictures including a rock and a sock depends upon hearing differences between the consonants "l", "s" and "r." Hearing the high frequencies is essential to successful discrimination between the consonants whereas the high tones not so necessary in recognizing the vowels. Consequently, this test should reveal cases with hearing losses for high tones which would be missed using the digit record.* At the time of this writing the items included in the test based upon the selection of pictures are very poorly chosen and until certain technical improvements are made in this record it cannot equal the test which is based upon hearing recorded numbers. Although the records on which tones or the names of objects are recorded can be more selective for high tone losses than the digit records are, none of these devices can approach the accuracy of the discrete frequency audiometer in measuring the efficiency of hearing for high tones.

*The different records mentioned are manufactured for specific makes of audiometers and cannot be used on all audiometers because of variations in impedances. None of the improved records to date make it possible to test hearing as accurately with the multiple audiometer as with the discrete frequency equipment.

The Relative Merits of the Two Types of Audiometers

The multiple audiometer has a distinct disadvantage in that it does not reveal hearing losses affecting only the higher tones. This is especially unfortunate from the standpoint of prevention since these high tone losses are so frequently the incipient losses. Losses for high tones are indications of conditions in the nose and throat, which if not corrected, may result in significant impairment of hearing. It is, however, useful in selecting pupils who have handicapping losses. Other frequently heard criticisms are: that too much time is consumed in setting up equipment and in correcting papers; that pupils fail to understand directions; that the equipment gets out of repair, etc. In regard to the time involved in setting up the multiple audiometer and correcting test sheets, the fact remains that a large number of children can be tested more quickly by the multiple unit than by the individual unit. An expertly trained nurse or teacher will do well to test from twenty-five to thirty-five pupils on the discrete frequency audiometer in one day, while she can test up to two hundred fifty on the multiple audiometer, in addition to checking their papers and retesting children who show impairments. Other criticisms invariably apply equally to both types of equipment, and signify only that general competence, careful forethought and organization are all necessary for the effective use of any instrument for measuring hearing. In the State plan for using the multiple audiometers every possible effort is made to insure the satisfactory operation of the equipment. Carefully planned procedures are presented to make it possible for the testing to be done effectively, using the minimum amount of time.

The criticism that the multiple audiometer does not reveal incipient or high frequency losses, however, is a valid one, and whenever a practical program can be set up whereby all tests are made with a discrete frequency audiometer the use of multiple units should be discontinued. Even though it is possible to test only the incoming pupils of one grade each year on the individual audiometer, such a testing program will, on the whole, be more satisfactory than one which provides for the regular testing of incoming pupils of two or more grades annually with the multiple audiometer.

Authorities in the field agree that the multiple audiometer is a relatively useful piece of equipment. The advantages of the individual machine justify a preference for it, but the use of a group audiometer should by no means be discontinued until an improved substitute program is provided. If purchasing a discrete frequency instrument will mean that instead of testing all of the children periodically, only those who are referred by a teacher or nurse will be tested because of the additional time necessary to administer the individual tests, then the acquisition of the individual audiometer will result in a poorer program instead of a better one. The reasons for this are presented in the following discussion of screening tests.

There are certain instances where the multiple units have advantages over individual audiometers. In pre-school clinics where persons who have had considerable experience in administering discrete frequency

tests to young children are not available, the phonograph audiometer, using the monitor method which is described on page 36, furnishes a quick and relatively effective means of selecting children with impaired hearing. It is often possible to make successful tests by this same monitor method with retarded children who do not respond to the more abstract discrete frequency test.

Screening Tests

A screening test is one by which a total school population is examined in order to select those pupils whose problems warrant special study. In a hearing program it is especially urgent to screen the complete school enrollment since minor and incipient losses invariably escape the notice of the teachers, and the pupils themselves are usually unaware of their presence. These losses are the very ones which must be discovered early if a prevention program is to be effective.

Ideally, every child should be tested each year by some screening technic. However, in practice it is wise to screen a group which is not so large that the testing and follow-up work cannot be done adequately. The follow-up work should properly include medical examination and care as well as essential educational adjustments. The suggestion is usually made that certain grades be tested each year so that all pupils will receive tests at definite intervals in their school careers. The particular grades selected depend upon the equipment and the testing technics used. Suitable grades are suggested later in connection with the separate discussions of the different equipment and technics. The following types of screening tests are used:

1. The regular discrete frequency or threshold test.
2. The discrete frequency screening test.
3. The multiple audiometer test.

The technic referred to in item 2 is a rapid test on the discrete frequency audiometer, differing from item 1 only in the time required for each test. It is discussed on page 24 under a separate heading. In a sense, the regular test by the discrete frequency audiometer is more than a screening procedure in that the screening test may be thought of as being less thorough. However, since the regular discrete frequency test is recommended as a technic for testing total school enrollments it is listed here as a screening device.

The supposition is that the screening test is to be followed by a more careful test which would, of course, be the regular test with a discrete frequency instrument. This is not necessary when the careful discrete frequency test is used as the screening device, although with young or retarded children an examiner will frequently want to repeat tests in order to be sure of his results. Where the lack of equipment and personnel does not permit following the screening step with the more reliable test, medical referrals may be made on the basis of careful screening tests alone with the assumption that medical examination is suggested on the basis of the high probability that hearing losses are actually present among the selected children. Imperfect as the multiple

audiometer may be, its errors are most apt to be errors of omission and its results cannot be disregarded in the face of conflicting results gained by whisper, watch tick or fork tests. Classroom adjustments also may be made on the basis of careful screening tests alone, but special school placements should be made only after regular tests with discrete frequency audiometers.

C. A PROGRAM FOR USING THE DISCRETE FREQUENCY THRESHOLD TEST

The following is a discussion of pertinent points to be considered in setting up a program using the discrete frequency threshold test. The material relative to the use of the audiometer is presented in considerable detail with the view to giving the nurse or teacher an understanding of the procedures rather than simply prescribing a set routine for testing. An individual test is always a highly personal matter. The basic hypothesis of this section is that the most satisfactory results will be had when an examiner is thoroughly familiar with the requirements of discrete frequency testing so that he can make intelligent variations of his procedure as the need arises.

The program using the threshold test is given first preference, although many school districts will continue for some time with one of the alternative setups. School officers who are purchasing new equipment for hearing testing should buy discrete frequency audiometers. All audiometers purchased should carry the approval of the Council on Physical Medicine of the American Medical Association. The names of the manufacturers of such approved instruments as well as the order numbers of the specific models of their equipment which have such approval may be obtained by writing to: The Council on Physical Medicine, 535 North Dearborn Street, Chicago, Illinois.

The Parts of a Discrete Frequency Audiometer

A discrete frequency audiometer, regardless of its make, will consist essentially of a compact, boxed unit with certain accessory parts. The accessory parts may include an extension cord by which the audiometer can be plugged into an electric outlet; a second electrical cord ending in a push button switch by which the subject signals to the operator when he hears a test tone; an air conduction receiver; a bone conduction receiver; and a headband for holding the receiver over the ear. The headband is especially important for young children who tire when they are expected to hold a receiver in place and who vary the pressure and position of the phone as they become restless.

In some instances a microphone attachment is available by which the operator can amplify the sound of his voice, either to give instructions to a very hard-of-hearing subject, or to determine in a rough way whether or not a child who does not respond well to the regular test has some usable hearing. A masking device* is usually built into the audiometer.

*The use of the masking device is presented on page 12.

The microphone, the bone conduction receiver, and the masking device are all unnecessary for the usual school testing program, which is set up simply to select the pupils who have significant hearing impairments. These additional devices are important in making more careful studies of hearing problems in a clinic, or where a district wishes to have a more thorough program than the average one. When bone conduction tests are included, a second air conduction receiver is necessary for masking the ear not under test. This additional receiver is also essential for masking the better ear while measuring the hearing in the poorer ear during air conduction tests, when there is a significant differerence in acuity between the two ears.

It is important to have a carrying case for an audiometer which must be moved from one room to another or from one building to another. Space should be provided in the case for the receivers and other attachments. Dropping a receiver will often damage it to the extent of making tests with it invalid.

The Panel

The front or working part of the audiometer is called the panel. On the panel are at least two dials, several switches and often the jacks into which accessory equipment is plugged. These jacks are sometimes placed on the rear surface of the audiometer. One of the dials controls the frequency (roughly, the pitch) of the testing tone and a second controls its intensity (roughly, the loudness). By adjusting the two dials it is possible to put any of the test tones through the receiver at varying levels of intensity, ranging from levels at which the tones are not audible to the average ear to levels at which these tones are uncomfortably loud to the same ear. A third dial is found on an audiometer of a particular make, by which the machine is calibrated each time before it is put into use.

One of the switches on the panel is used to turn the audiometer on and off. A second, a small noiseless switch, enables the operator to cut off the tone at any point in the test. This switch is usually called the interrupter. A third switch is often included to make the microphone attachment active.

The Testing Room

Ideally, a soundproof room should be used for all audiometric testing. However, in most instances a quiet room located on the upper floor of a building and isolated as well as possible from building and street noises is adequate. The satisfactoriness of a room may be determined roughly by administering several tests during the regular school day to persons of known normal hearing. If the results obtained in the selected room do not indicate losses it may be considered usable. The room should have an electrical outlet and should be large enough to accommodate a small table and at least two chairs. A 6 foot x 8 foot floor-space is adequate.

There are several possible adjustments where reasonably quiet rooms are not available. Sometimes it is practical to have children report for

tests to neighboring buildings or homes. Conditions in a room can be improved by covering the walls with fibreboard or drapes; carpeting the floor; applying heavy felt weather stripping to doors; putting a layer of fibreboard on each side of the door so as to cover both surfaces completely, including vents and windows; placing trap-doors of double fibreboard over ventilators and constructing shutters of a double thickness of fibreboard for the windows. Obviously such treatment for a large room is expensive. An alternative is to construct a prefabricated, portable, soundproof booth which can be transported to and set up in any school building. Such a booth should have walls, door and ceiling of double fibreboard construction with the intervening space filled with rock wool. The floor should be of double construction of wood with a layer of rock wool between. A small built-in shelf to hold the audiometer and an electrical outlet will be necessary in the booth. Inside dimensions of the booth should be 6 feet x 6 feet x 7 feet as minimum.

Ventilation is a problem in a booth or small testing room. The door should be kept open while the test is being explained and closed only during actual testing. Having an electric fan to hasten the exchange of air between tests is practical.

Setting Up the Equipment

Ordinarily, it is necessary only to connect the audiometer to the electrical outlet, insert the plug of the receiver into the proper jack and turn on the main switch to be ready for a test. The current must be left on for a few minutes before actually beginning the test so the tubes can warm up. With the Western Electric 6-A and 6-B audiometers it is necessary to calibrate the machines each time before they are used. To calibrate the machine turn the intensity dial as far as it will go in the clockwise direction and set the frequency dial at zero. Then, holding the air conduction receiver to the ear, turn the calibrating dial, which is the small dial on the left side of the panel as the examiner faces it, until it is at a point where the least amount of sound is audible through the earphone. With the dial at this quiet adjustment the machine is calibrated as well as possible under existing conditions.

Electrical machines of any type operating in the neighboring area will set up a line disturbance affecting the audiometer. The presence of such a disturbance can be detected by setting the frequency dial at zero and the intensity dial at maximum. Then, if the sound coming through the receiver fluctuates as the interrupting switch is opened and closed a disturbance is usually present. Such interference, unless very marked, will not appreciably affect tests of persons whose hearing is normal or near normal. However, in the case of a very hard-of-hearing subject the disturbance might be confused with the testing tones. If the source of the disturbance can be controlled it should be eliminated. Tests on hard-of-hearing pupils can be repeated on a day when conditions are more favorable. Certain disturbances can be eliminated by reversing the prongs of the plug in the outlet. A standard appliance can be purchased through radio supply companies to filter out line disturbances.

Preparing the Child for the Test

It is not an unusual experience to have a young child cry when he is brought to an isolated room by an examiner who is a stranger to him. Such an emotional upset may be great enough to make testing him impossible or it can be distracting enough to influence his responses. A classroom teacher can help to prepare a child for a test by previously explaining to him what the test will be like. Comparing the equipment to a radio or a telephone is a useful device. In the case of a child who is particularly shy, having another child accompany him to the testing room is assuring to him, and it helps at the same time to remove the stigma of being singled out for special examination, which may become too frequent an experience for exceptional children.

Sometimes a child's fear is overcome by having him participate in the preparing of the testing situation. He may be instructed by the teacher to conduct the examiner to the testing room, where he can be of help by assisting in the arrangement of furniture, plugging the audiometer cord into the electrical outlet, connecting the earphone, and even listening to the earphone, supposedly to be sure that the machine is working.

Accurately testing the hearing acuity of a young or nervous child will require full cooperation on his part. It is important to develop rapport so that his responses will be entirely normal for him.

Selecting a Signal

For the actual test it is obviously necessary that there be some arrangement by which the subject lets the examiner know when he hears a sound and when he does not hear it. Most discrete frequency audiometers have a signal light built in which is controlled by a push-button switch at the end of an electrical cord. Holding this switch and flashing the signal light has been confusing to many youngsters, especially to immature and unsophisticated children. Such switches frequently develop mechanical noises which are distracting. Many testers have worked out their own signals, such as having a subject raise a hand, lift an index finger, or nod the head when he hears a tone. The relative merits of these various signals are probably only academic. Offhand it seems that such a large movement as raising the hand could be distracting. Nodding the head can change the adjustment of the earphone and thus alter the threshold.

A system which proves satisfactory is to place an index card (Figure 1) on the table beside the subject, with the statements, "YES, I hear it," and, "NO, I do not hear it," typed or written on it. By shifting his finger from the "YES" to the "NO" the subject can inform the operator when sounds are audible to him and when they are not audible. The use of this particular device seems to be the least confusing to children who can read, and in many cases it seems to help excitable or distractable individuals to keep their minds on the task at hand. Other signals adaptable for young children are presented later.

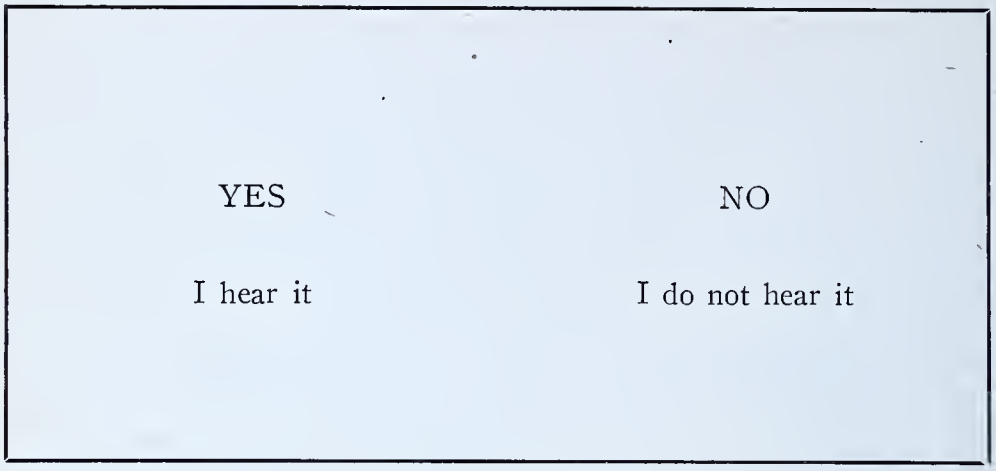

Figure 1. The Signal Card

Explaining the Test to the Child

Reliable response to the audiometer test, whether the subject is a child or an adult, depends upon his understanding what is expected of him in the testing situation. The essential parts of any instructions are to have a subject understand that he must listen for a tone and signal to the operator when he hears a tone and when he does not hear it. Many testers believe that it is helpful to give the subject a preliminary idea of what the stimulus tones are like before beginning to test. This can be accomplished by laying the receiver on the table, face upward, and turning the intensity dial to its maximum adjustment, sweeping through the various frequencies, letting the subject listen to each of the test tones for a few seconds. A young child frequently needs some practice in using the signal.

Testing Procedure by Air Conduction

The air conduction test is accomplished by placing the air conduction receiver over the ear under test. The sound energy passes through the air in the external canal to the ear-drum, and then reaches the cochlea via the chain of ossicles in the middle ear. In a sense the air conduction test is an "over all" test in that it utilizes all three of the main parts of the ear: the external, the middle and the internal divisions.

Since most individuals, especially the young and the retarded children, have better immediate success in isolating middle frequency tones, viz., 512, 1024, 2048 and 4096, it is advantageous to test these frequencies first, and then go to the tones which will be more difficult to isolate. The recommended procedure is to begin with 1024 and to progress through the higher tones, returning to take 512, 256 and 128 in order. By testing the frequencies in this order a subject learns the testing procedure with the tones he hears best and then proceeds rapidly to the high tones which are the first to be affected by fatigue, taking low tones last. If the hearing is normal at 256 there is little point in testing 128. The additional tones 2896 and 5792, which are included on some

audiometers, need not be tested unless a person shows a loss on other tones or an unusually careful study of the hearing is desired. Likewise, if there is an obvious difference in the efficiency of his ears, a subject will usually have more success in the test situation if his better ear is tested first, so that he will be acquainted with the procedure when what will very likely be the more critical part of the test, the consideration of the poorer ear, is begun.

The threshold of hearing for a particular frequency is the lowest level at which a person can hear that tone. It may also be defined as the lowest point at which a person can hear the re-entry of a tone when the interrupter is being used. By the discrete frequency audiometer test the threshold for each test tone is determined for each ear.

Setting the frequency dial at 1024, start with that tone at an intensity at which a person with normal hearing may be expected to hear it easily, but not loudly enough to set up a ringing sensation in the ear. The aim is to be sure that the subject will have a clear impression of the test tone before the intensity is reduced to a point at which he will have to rely upon his memory of the tone in order to recognize it. If the tone is presented to the subject at too high an energy level, the effect on his ear will interfere with his hearing the same tone when the intensity is reduced, thus affecting the test results. A suggested point at which the average subject will hear a tone comfortably without overstimulating his ear is at the 20 or 25 db. level.

Once the operator is sure that the subject has a clear idea of the test tone for which he should listen, he should reduce the intensity rapidly to a point near the subject's threshold for that tone. He may begin the test by putting tone 1024 through the earphone at the 20 db. level, using the interrupter several times to be certain that the subject is hearing the tone at that point. The intervals of tone should be long enough so that he can get a clear impression of it. Explain to him that that particular tone is the one for which he should listen. Then interrupt the tone and reduce* the intensity to the 10 db. level. If he signals that he hears the re-entry of the tone when the interrupter is released several times at this level, interrupt the tone again and reduce the intensity to the zero level. If the subject indicates that he hears the re-entry of the tone at this new level when the interrupting switch is opened and closed several times, it may be assumed that he has normal hearing for that tone, and the threshold for that tone can be recorded as zero.

If, while the intensity is being run down from the initial 20 db. level, the subject indicates hearing the re-entry of the tone at 10 db. but he does not hear it at the 0 level, increase the intensity from 0 to 5 db. If he indicates then that he hears the tone when the interrupter is used several times, consider 5 db. as the threshold. If he does not hear the tone at 5 db. adjust the intensity dial for 10 db., and then if he hears the re-entry of the tone, the threshold is at 10 db.

In other words, the subject first experiences the tone at a level at which he can hear it comfortably. Next, the intensity is reduced by

*Whenever either the intensity or the frequency dial is being adjusted while a person is holding the receiver to his ear, the tone should be interrupted. Otherwise, sound which results from the movement of the dials comes through the receiver and confuses the subject.

10 db. steps until a point is reached at which he does not hear it. After that the intensity is increased by 5 db. steps until he is aware of the re-entry of the tone. If, in reducing the intensity, the subject indicates hearing at the 0 level, it is not necessary to proceed further, since he has demonstrated normal hearing. Thresholds may be traced below the zero level but this is not important in routine testing in the schools.

Subjects with significant hearing losses will frequently have to have their initial experiences with the test tones at levels higher than 20 db. However, it is poor practice to estimate their thresholds in adjusting the intensity dial when beginning to test a tone. If the subject does not hear the tone at the 20 db. level, the safest procedure is to run the intensity up rapidly by 10 db. steps until the subject signals that he hears the re-entry of the interrupted tone. Then adjust the intensity dial to approximately 15 db. above this roughly determined threshold, and trace the threshold carefully by reducing the intensity by 10 db. steps until the tone is no longer heard, and then increasing the intensity by 5 db. steps until the re-entry of the tone is again recognized.

In interrupting a tone at any level it is important not to develop a rhythm so that the subject learns to give the "yes" and "no" signal at regular intervals of sound and silence. Varying the lengths of the intervals of tone helps to keep the subject more alert. When the tones are so quiet that the subject barely hears them, make the intervals of tone longer than the intervals of silence. During the periods when no tone is coming through the earphone, an especially conscientious subject who has good memory for the test tone is apt to signal that he hears the tone when actually he cannot. Some incorrect responses when no tone is coming through the earphone or when a threshold is being approached are to be expected. However, if a subject consistently signals that he does not hear a tone when the tone is coming through the receiver, the examiner may safely conclude that he is not hearing at that level, and raise the intensity by another 5 db. step.

Masking

If there is a difference of 30 db. or more between the air conduction thresholds for any or all frequencies in the two ears it is a problem to test the poorer ear accurately because the intensity necessary for reaching the threshold for the poorer ear is great enough so that the sound may be heard by the better ear. Consequently, one sometimes gets what is known as a shadow curve in making a test on a poorer ear. Such a shadow curve follows the profile of the better ear, but the thresholds are approximately 30 db. lower. In such a circumstance the hearing in the poorer ear is not being measured accurately.

The better ear is prevented from participating in the test by using a masking tone which is delivered to the ear not under test through an air conduction receiver. The masking tone may be a mixed tone or it may be a pure tone of the same frequency as the test tone being used on the poorer ear. If a mixed tone is used it should have a frequency range including all of the test tones. The intensity of the masking tone

should run up to 80 db. and should be controlled so that it can be increased or decreased by 5 db. steps. The amount of masking necessary depends upon the disparity between the two ears.

In testing by bone conduction the ear not under test should always be masked. When there is a difference of 30 db. or more between the air conduction thresholds of the two ears for any frequency the better ear should be masked.

Masking is not ordinarily used in school testing programs because the participation of the better ear will not interfere with the detection of the poorer ear as being defective, even though it will prevent an accurate measure of the degree of the loss in that ear. The information given above is, consequently, included to assist with the interpretation of the test results obtained in cases of unilateral impairments. It is not an attempt to give adequate detail for the use of masking in testing.

Testing Procedure by Bone Conduction

The bone conduction test is accomplished by placing the bone conduction receiver on the mastoid bone of the ear to be tested and tracing the frequencies in the same way as they are traced in the air conduction test. The idea behind bone conduction testing is that the sound energy is transmitted to the nerve endings in the cochlea through the bone, rather than by way of the outer and middle ear, as is the case in the air conduction test. Thus by the bone conduction test one should be able to measure the sensitivity of the nerves by circumventing a defective conductive mechanism in the middle ear. A loss due to a defective conductive mechanism is referred to as a "conductive deafness." A loss caused by a nerve involvement is called a "nerve deafness" or a "perceptive deafness." Whether or not a bone conduction test, supplemented by the results of an air conduction test, can accurately represent the relative efficiency of the auditory nerve and the middle ear is highly problematical.

In general, bone conduction test results are harder to interpret than are the results of air conduction tests because the bone conduction thresholds of normal individuals vary so widely. A satisfactory norm for bone conduction has not been set up. Although bone conduction tests undoubtedly have significance in medical diagnosis, the additional time necessary for their administration may well be questioned when tests are made only to determine which children have hearing losses.

Thresholds for the different frequencies are from 40 to 45 db. higher for bone conduction than for air conduction. Consequently, the same calibration on the intensity dial cannot be used for the two tests. The necessary adjustment of the equipment is accomplished by fastening a ring with the special calibration for bone conduction around the intensity dial on the Western Electric audiometer. Other audiometers have the intensity readings for bone conduction tests printed in contrasting color or size. The ear not being tested should always be masked in bone conduction tests.

Commonwealth of Pennsylvania
DEPARTMENT OF PUBLIC INSTRUCTION
Harrisburg

AUDIOGRAM OF _____ Age:_____ Grade:_____ Date:_____ 194_____

SCHOOL _____

REMARKS:

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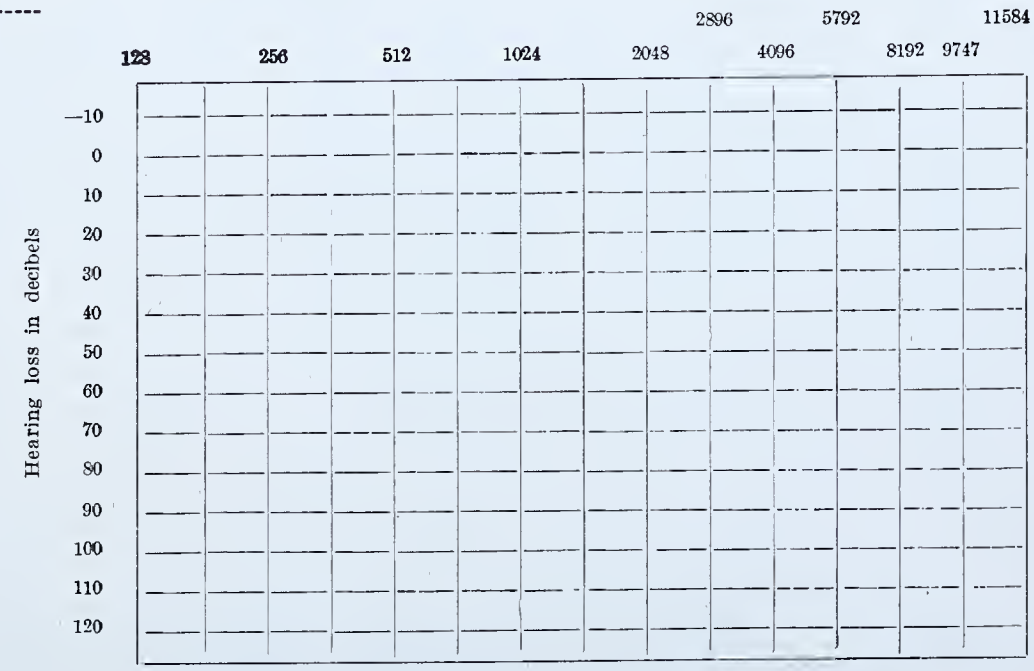
RECORDER _____

PISE 18
9-44



Frequency in cycles per second
Air Conduction: Right O Left X
Bone Conduction: Right ⊐ Left ⊏
Masking Used: ▲

Figure 2. An Audiogram

Recording the Results

The results of a discrete frequency audiometer test are frequently plotted on a specially designed chart called an audiogram (Fig. 2). Along the upper horizontal line are points representing the test tones. These points are continued by vertical lines. Points at the sides of the chart represent the intensity levels and they are continued by horizontal lines.

If the threshold of hearing for an ear of a subject is found to be at the 10 db. level for tone 512, that threshold is marked at the intersection of the line projected downward from the point representing tone 512 and the line projected horizontally from the point representing the 10 db. intensity level. The threshold for each ear is designated by a different symbol, usually an "O" for the right ear and an "X" for the left. When the thresholds for all test tones have been determined for both ears, the different thresholds for each ear are connected by lines, a distinctive type of line being used for each ear. Lines of different color may be used to represent the profiles for the different ears, or dotted and solid lines of the same color may be used. It is important to be consistent in one's own symbols for designating thresholds for the right and left ears and also in the types of lines used in connecting the threshold points. The symbols used should be explained somewhere on each audiogram.

The audiogram has spaces for the complete identification of the subject, including his name, age, address, and the date of the test. Additional space is provided for remarks in which should be noted such items as an evaluation of the rapport, and the general satisfactoriness of the testing situation.

The audiogram has certain serious limitations, especially in connection with school programs. Its biggest disadvantage is that only one test can be recorded on each card, making a rapid comparison of the results of several tests difficult. In a school or clinic program where many tests will often be made on selected cases, the form duplicated in Figure 3 is more usable. On this one form the thresholds for fifteen tests can be recorded numerically. The card has adequate space for identification material. The reserve side of the card is used for comments on the test situations.

Grades To Be Tested

To meet the minimal requirements of a testing program the total enrollment of at least one grade level should be tested each year, along with the following pupils:

1. Those who showed significant losses by the previous year's tests.
2. Those who moved into the district during the past year.
3. Those who had significant illnesses during the preceding year, including mumps, measles, whooping cough, meningitis, diphtheria, scarlet fever, earaches or running ears.

Name _____ (last) _____ (first) HEARING RECORD Birth date _____ (month) (day) (year)

Residence _____ Phone _____ School _____ District _____

Date	Test by	RIGHT EAR AIR CONDUCTION											LEFT EAR AIR CONDUCTION										
		128	256	512	1024	2048	2896	4096	5792	8192	11584 9747		128	256	512	1024	2048	2896	4096	5792	8192	11584 9747
		RIGHT EAR BONE CONDUCTION											LEFT EAR BONE CONDUCTION										

Figure 3. The Hearing Record

If only one grade is to be tested regularly it is suggested that it be the first grade. When a program is being initiated with a relatively inexperienced person in charge, it is well to test the children of a grade above the second during the first year, since it is more difficult for a beginner to get reliable responses from the younger pupils. However, at the opening of the following school year the program should be carried through with the first grade children.

If sufficient personnel is available grades other than the first should be included in the annual program. A highly satisfactory arrangement is one by which all children receive tests every third year, which would include those in grades one, four, seven and ten. If only one grade, in addition to the first can be tested, the fourth grade should be added, and the next preference is for grade seven, in event that the program can be expanded further. The emphasis should always be on discovering the impairments among the younger children. Additional grades should be brought into the program only after consideration of the possible follow-up work. The person in charge of the testing should not increase the number tested at the expense of being so taken up by routine examinations that adequate follow-up procedures are not taken with the children who have hearing impairments.

When any new program is initiated, school administrators are inclined to wish to include in it all pupils who have not had the benefits from the innovation in the past. It is much better to start out testing only a certain grade or grades, taking the long term view of the program, rather than to try to make up for previous years.

Qualifications of Examiners

Any reasonably competent nurse or teacher should be able to learn to use the individual audiometer satisfactorily. If teachers are going to do the testing, it is advantageous to have one person selected to do all of the testing for a small district or for one school building in a larger district, since one skilled person will be able to work more rapidly than several individuals who do not have as much experience. Anyone proposing to test children with a discrete frequency audiometer must be willing to have specific training in it use. Such instruction should be obtained through a college or university. It may be possible, in certain areas, to get training on an individual basis from a medical specialist. Under no circumstances should an inexperienced individual begin a program with no more background than is available through a salesman or a manufacturer's manual.

Preliminary Arrangement

Before beginning to test children in a school building, it is always essential to have a preliminary understanding with the administrator in order to have satisfactory testing conditions as well as to be sure that procedures are set up which will enable the examiner to make the most efficient use of his time. The following items are worth consideration as a basis of the conference with a building principal:

1. Make arrangements for using a satisfactory room if a specially constructed or treated room is not available.
2. Even when treated rooms are available it will be well to take all additional precautions possible to reduce building noises and sounds from playground activities to a minimum.
3. Have the teachers see that the identifying data on the THE HEARING RECORD for each pupil are written in ahead of time.
4. Request an older pupil to keep order in the corridor as well as to see that pupils report on time for tests.
5. Arrange to have the pupils report according to the plan the examiner chooses to follow.
6. Reach an understanding on the responsibility for follow-up procedures and recording test results on the health cards.

Since the discrete frequency tests involve so few pupils at one time, and since a test may be interrupted at any time without particular harm, the school routine need not be disturbed except to maintain reasonable quiet. Keeping disturbances to a minimum can greatly increase the number of tests the examiner can complete in a day.

Manner of Having Pupils Report

In order to make the best use of the examiner's time it is well to have at least one pupil waiting for a test on a second pupil to be completed, so there will be no lag between subjects. When the testing room is large enough to accommodate an additional person time may be saved by having one pupil observe the test made on another. This procedure eliminates the necessity of making much explanation of the procedure to each new subject. The pupils allowed to remain in the testing room must be mature enough so they will not become restless. With younger pupils who may tire before their tests are completed, several children may be kept waiting outside of the testing room. The test can be explained to all of them at once and then they can be rotated as parts of the test are completed on each child until all of the examinations are finished. Unless a pupil shows definite signs of inattention or fatigue such rotation is not necessary.

Testing one first grader after another throughout a day may be a strain since they are more difficult to work with than older pupils. The examiner will do well to examine children of different grades each day if pupils of more than one grade are included in the program. This suggestion has an additional advantage in that older pupils may be examined after first graders are dismissed. It is difficult to arrange a full day's work when only first graders are examined.

Time Required for Each Test

On an average, a discrete frequency audiometer test can be completed in about ten minutes. With older and more intelligent pupils the testing can be done in much less time. Over a period of time an examiner

will average at least twenty-five individual examinations per day. Under optimum conditions he may complete as many as forty.

An operator must bear in mind that his own degree of alertness during a test is probably the greatest single variable which can affect the reliability of the results. It is essential that he allow himself rest periods during the day to break the routine of having one child after another report at intervals of from six to ten minutes.

Re-tests

The American Academy of Ophthalmology and Otolaryngology suggests that all those who show a loss for one ear in excess of 15 db. (20 db. or more) at two or more frequencies be referred to an otologist. Critical levels for various educational adjustments are discussed in Part II of this bulletin in connection with educational adjustments for acoustically handicapped children.

With other screening technics it is suggested that every pupil who shows a critical loss by the first test be given at least one re-test. This may not be necessary when the discrete frequency audiometer is used for the first test. However, even the most expert examiner will occasionally wish to re-examine children with whom it is difficult to establish rapport. The necessity of such repeat tests cannot, therefore, be set up as a policy, but must be left to the discretion of the operator. During his first year, he probably ought to give a second test to all children who show significant losses by the first test until the similarity between the results on the two tests convinces him that his use of the equipment is satisfactorily accurate. A variation of 5 db. is not a significant one.

Repair of Equipment

A discrete frequency audiometer goes out of adjustment just as any electronic equipment. The audiometers ought to be calibrated at least once each year. Such service can be had through the manufacturer, or individuals in physics departments of universities, or large colleges can check the output of the instruments. The receiver of the audiometer should always be included when equipment is checked. If one of the state-owned individual audiometers develops difficulty in the field, the Division of Special Education in the Department of Public Instruction should be contacted before any arrangement for repairs is made. The examiner can check the intensity calibration roughly by listening to the test tones himself. If he has normal hearing and he hears the tones at approximately the 0 intensity level, he may assume the audiometer is in fairly usable condition.

Testing Very Immature Children and Exceptional Cases

Most of the children of early school age can be tested in the same manner as adults, except that some signal other than the card described above must be used for the non-reader. Having a youngster raise a finger is satisfactory to indicate that he hears the re-entry of a tone.

Unless an unusual circumstance makes adaptation of the regular testing procedure necessary it is as well not to complicate a program by an elaborate approach for youngsters. The following suggestions are made for the exceptional cases who do not respond to the usual technics:

1. Seating Arrangement.—It is sometimes difficult to hold the attention of an immature child. In such a case, instead of seating him so that his back is toward the examiner it is necessary to have him face the examiner. Using this arrangement the operator must be especially careful to avoid giving the pupil cues by changes in facial expression or by noticeable movements in manipulating the controls on the panel. Seating the child directly across a table from the operator prevents the subject from observing much of the testing activity. By being able to look directly into a child's face the examiner can hold his attention more affectively and he can also evaluate the child's effort to cooperate.

2. Attention.—Care should be taken, especially with younger children, to move rapidly enough with the test so that the subject does not become unnecessarily tired. Even adults will find the test fatiguing, and actually exasperating, if the operator spends too much time checking and re-checking responses at threshold or near threshold level. Many examiners feel that with young or retarded children the short attention span and uncertain tonal memory make it impractical to spend more than thirty or forty seconds testing any one frequency. If a frequency cannot be satisfactorily charted in that time it is suggested that it be left for the time being and attempted again later.

3. Time Required.—Ordinarily, it does take longer to administer a test to an immature child than to a more advanced youngster. However, the additional time is better spent in the intervals between the tracing of thresholds for the various frequencies than in the actual time taken for checking each frequency. It often seems possible to hold a distractable child's attention for very brief periods, but this degree of effort cannot be sustained so that the operator can proceed rapidly from one frequency to the next. Rest periods are essential, sometimes after each frequency, and sometimes after several frequencies.

4. Motivation.—Various schemes by which young children can be interested in the testing procedure have been advanced by persons who have had considerable experience in administering discrete frequency tests to youngsters of early-school and pre-school ages. Assorted pictures of living things and environmental objects have been used, usually by associating a particular picture or object with each test tone. For instance, a picture of a child blowing a whistle may be introduced in connection with tone 256. Giving the child a small piece of cotton, he may be instructed to cover the opening of the whistle each time he hears the tone, the assumed connection being that the child will associate the test tone with the imagined sound of the whistle. As soon as he covers the opening the operator cuts off the tone with the interrupter. The threshold is determined by the intensity at which the child does not show that he hears the re-entry of the tone.

Another possibility is to have a child imagine that he is an airplane pilot and that each tone represents some signal he must hear, as, tone 1024 may mean that he must come down for passengers, and tone 2048 may mean that there is an ice storm ahead, etc. By flashing the signal light, or just pressing a button he indicates to a ground crew that he has heard the signal. In a similar way, the child may be told that each stimulus tone represents an airplane and that when he hears the airplane he must have a blackout. The signal cord may be used for the blackout apparatus.

On the whole, such elaborations have not seemed essential. The child who responds quickly in the play situation is usually the one who can cooperate with the usual procedure. The responses of very slow or restless children are not, on the whole, more reliable when games are introduced. To sustain the attention of some children the operator must keep asking "Do you hear it now?", and this direct approach is usually easier for them to comprehend than any play device. The games frequently interfere with the tests of highly imaginative youngsters. Nevertheless, it is useful for a tester to have some repertoire of play approaches for exceptional cases. Sometimes, for instance, even in the case of a very cooperative child, the attention may lag toward the end of a test. To mobilize his effort for the last frequencies it is often useful to tell him that the tone is the sound of an airplane that is coming down and that he should try to see how soon he can hear the approaching plane. Occasionally introducing such a device will make it possible to complete a test on a tired child. Play situations are much more useful with children whose hearing is normal or very close to normal than they are with youngsters who have significant impairments.

5. Children Who Cannot Cooperate Actively.—In cases of very young or very retarded children, as well as with children who have considerable losses, it is often impossible to get active cooperation in the test situation, which makes all of the procedures given thus far unusable. Usually these youngsters can be seated before the examiner so that their facial expressions are easily visible, and interested in some such quiet activity as looking at pictures, scribbling on paper, or handling a toy. An assistant working behind a child can approach his ears with an active receiver. A rough estimate of hearing can be made from the intensity of the tone and the distance the receiver is from the child's ear when he shows that he hears a tone. Such a procedure must be a long, drawn-out affair, because the subject should be allowed time to become engrossed in his play or at least to forget about the earphone before the next trial can be made. If the procedure moves too rapidly a child will look up expectantly at intervals and give the impression of hearing when he is only anticipating an interruption. This method is an attempt at a substitute for the sound field test in which the tones are put through a loud speaker at controlled intensities instead of through a receiver.

6. Demonstrating Usable Residual Hearing.—In a case where a bilateral impairment is very marked, especially when the child has sustained the loss since birth, it is not often possible to get an accurate

measure of hearing on the first attempt because of the difficulty in communicating with the youngster and because of his limited experience with sound. The examiner will, ordinarily, do well in such a situation simply to establish the presence or probable lack of usable residual hearing. The procedure given in item 5 may be used when active cooperation from a child is not possible or to supplement the following suggestions.

Placing the receiver on the child's ear the examiner may watch for a change in a subject's facial expression as the intensity is gradually stepped up from a level of approximately 25 db. When the examiner believes that a child is perceiving a tone at a particular level he can use the interrupter to see if the expression is again changed with the reentry of the tone. With such subjects the operator will do well to avoid increasing the intensity too rapidly to guard against reaching a point at which the tone will be annoying.

The microphone circuit, which is included with some discrete frequency audiometers, is useful with these children in that it enables the operator to amplify his voice and to control this amplification by adjusting the intensity dial. When there is no satisfactory indication of success in hearing tones a child can sometimes be taught to identify a word or two by amplifying the voice. To do this place several pictures of familiar objects before a child and permit him to watch the examiner's lips as well as to hear his voice through the receiver. The operator names each picture as he places the child's finger on the picture named. The examiner then teaches the child to point to indicated pictures by himself as he watches the tester's face and hears the voice through the receiver. After several successful trials in this latter procedure the operator conceals his lips or moves to a position to the rear of the youngster to see if he can respond through hearing alone without the assistance of lipreading. The microphone can also be used by having a parent or friend pronounce names of persons and pets or repeat expressions which the child might have been thought to have heard at one time or other. Hearing may be indicated by looks of recognition or attempts to imitate sounds.

In attempting to reach a decision on residual hearing, information on a child's daily activities is important. Knowing whether or not he responds to calls, especially when his back is toward the speaker or when he is in another room is significant. The intensity of voice as well as other means parents use to get his attention is also interesting. The members of a family may insist that a child hears them simply because they speak as they tap on the floor or touch him in order to get his attention. Children who have some hearing will often hear telephone bells, whistles or airplanes. They sometimes attempt to use phones. They may enjoy listening to a radio, frequently turning the volume control for the maximum output and pressing a cheek against the cabinet. Evidence which parents use to convince an examiner that a child hears should always be received critically, and if possible, a parent should be requested to demonstrate the situations before the examiner. Never-

theless, such additional information is significant and it should be considered carefully in making a decision on the presence of usable residual hearing.

Such a time-consuming study of a child's hearing acuity is not required in the usual school testing program. It is frequently necessary in cases of children who are to be placed in special schools or classes. It is also used in collaboration with other data on mental and social maturity to determine how much of a child's problem is due to a hearing impairment and how much is due to general retardation. The tests to demonstrate the presence of residual hearing should be given by psychologists or supervisors who make decisions on special school placements.

7. Evaluating Test Results.—The responses of young or retarded children are not as consistent as shown by re-tests as they are with adults. Nevertheless, when the examiner's approach is skilled, even children of pre-school age can be tested satisfactorily. These children tend to have some difficulty in isolating the extremely high and the extremely low tones. It is to be expected that re-tests on this group will be necessary more frequently than with the general school population.

D. A PROGRAM FOR USING THE DISCRETE FREQUENCY SCREENING TEST

Testing Procedure

The discrete frequency screening test is a rapid test with the discrete frequency audiometer. Using this technic, the intensity dial is set at a level at which the tones are ordinarily audible, usually at 10 or 15 db. Starting at 1024 the operator shifts the frequency control so that the test tones are heard in the following order: 1024, 2048, 4096, 8192, 11584 or 9747, 512 and 256. There is no particular point in including 128 if hearing is normal for 256. The additional half-tones, 2896 and 5792, need not be considered in the screening test. The interrupter is used while the frequency dial is being shifted to eliminate confusing mechanical sounds as well as to enable the subject to hear each tone as an entity rather than as a part of one continuous tone of varying frequency. The subject may use the signal card to indicate whether or not he hears each frequency. The interrupter ought to be used several times with each test tone, with particular care being taken to vary the lengths of the periods during which the tones can be heard. Since 15 db. is the critical level for the discrete frequency threshold test, this test should select pupils with critical losses.

A variation of this screening procedure is to find the threshold for 1024, in the manner usually used with the threshold test and then keeping the intensity dial at the threshold level for 1024, sweep through the other frequencies. Sometimes it is helpful to test younger children by sweeping with the intensity dial set at 25 db. and then repeating the procedure with the intensity dial set at the 15 db. level.

The Usefulness of the Discrete Frequency Screening Test

Proponents of the discrete frequency screening test have claimed that as many as from sixty to seventy-five children can be tested by this technic in an hour's time. This number is high, especially for young children. In the matter of time the essentials of the screening test and the regular discrete frequency test should be the same. The problems of handling the pupils, explaining the test, and recording the results require the same amount of time. The only difference is in the manner in which the thresholds are traced, where the progress by both technics must vary in relation to the type of cooperation obtained from the individual pupil. The saving in time by the screening test cannot be as great as has been stated.

The choice between technics should depend primarily on the relative reliability of the tests and only secondarily upon the time element. A thorough study of the reliability of the screening test has not been made. In several areas it has been found to be quite unsatisfactory with young and immature children. On the other hand it has been quite usable with older pupils. The greatest source of unreliability in the screening test has appeared to be the extreme emphasis on speed.

In considering the discrete frequency screening test as an alternative to the multiple audiometer, the former has definite advantages; no test sheets must be corrected; a small office or anteroom may be used instead of a whole classroom; little effort is involved in setting up equipment; the equipment is more easily transported; school routine is not disturbed; pupils who have high frequency losses are more apt to be selected by the discrete frequency technic, and the equipment used for the discrete frequency screening test also can be used for the more careful threshold tests. In the matter of reliability the weaknesses of the multiple audiometer are known. However, these known weaknesses may not, necessarily, be more serious than the unknown reliability of screening with the individual audiometer.

The discrete frequency screening program may then be considered as less desirable than the program using regular discrete frequency threshold test, but at least as good as the multiple audiometer test. Particular care must be taken in using this technic with young pupils.

Organization

The general organization of the discrete frequency screening program is very much like that for the regular discrete frequency program. The essential differences are in minor variations in the methods of filling out forms and in the importance of re-tests.

In filling out Form PISE 19, THE HEARING RECORD, no marks are necessary in the columns for frequencies which are heard. A printed "L," indicating a loss, is placed in the columns for frequencies which are not heard. If only the date appears on the left-hand side of a horizontal line on which the results of a particular test are recorded one knows that the individual had a sweep test on the indicated date and that he showed normal hearing by that test. Similarly, the date appear-

ing with one or more "L's" written in the columns for certain frequencies indicates that a screening test was given on that date and that hearing for all frequencies was found to be normal with the exception of those frequencies which are indicated by the "L's."

Re-tests are more important with the screening test than with the regular discrete frequency test. Every pupil showing a critical loss on the first test should be given a second test, which should be the regular discrete frequency test.

E. A PROGRAM FOR USING THE MULTIPLE AUDIOMETER

During the past fifteen years the multiple audiometer has been the most popular instrument for screening tests of hearing, and it is at present by far the most widely used of all screening devices, although there is a general feeling that the discrete frequency audiometer will displace it. It must be borne in mind, however, that the idea of testing many pupils at one time is an attractive one when large populations such as public school enrollments are considered. The current multiple units are certainly not the best that can be manufactured. It is entirely probable that an improved multiple audiometer may yet be developed which will fulfill the requirements for a satisfactory screening program.

Since there is every indication that the multiple audiometer will continue in use for some time a program outline making use of this equipment is presented below. Although not entirely satisfactory, this program is a very useful one and should not be discarded until a better one is actually installed.

This program is written in terms of the multiple audiometers which the Department of Public Instruction owns and distributes for use in the public schools of the Commonwealth at the time of this writing. The procedures given are readily adaptable for districts which have purchased similar equipment.

Preparations Preliminary To Testing Program

The audiometers cannot stay long in one school. To make the best use of the equipment while it is available, it is suggested that essential forms and supplies be collected ahead of time so that the testing can begin as soon as the audiometer is received. In such preliminary plans the following things should be assembled:

1. A good supply of RCA Victor full-tone steel phonograph needles will be needed. No other type of needle should be used for the tests.

2. The school districts are expected to furnish their own test records. In the past, two records have been used—the three-digit record KS-6090, which was recommended for testing children above the fifth grade; and the two-digit record KS-6091, which was recommended for testing children up to the fifth grade. It was later suggested that the use of the three-digit record be discontinued and that a two-digit record be used with children of all grades. The new two-digit record, KS-10087, which was brought out in 1940 is preferred.

If a district has a supply of the three-digit records or the old two-digit records, KS-6091 on hand, it is suggested that they be used until they are ready for discard, after they have been played one hundred times. Thereafter the new two-digit record, KS-10087, should be purchased.

Records may be purchased from the Graybar Electric Company which has branch offices in Pittsburgh and Philadelphia. The address, "Graybar Electric Company, Philadelphia, Pennsylvania, or Pittsburgh, Pennsylvania," is adequate. Records KS-6090 and KS-6091 cost $1.35 each. The price of record KS-10087 is $1.75.

Since these records can be broken or damaged rather easily, it is advisable to have several on hand. If the program depends upon one record, a slight accident may cause considerable delay for replacement.

After being played one hundred times, the wear on these records is sufficient to make their further use for testing undesirable. Test results cannot be considered valid if the test record has had more than one hundred playings. The form illustrated in Figure 4 furnishes a single means of keeping count of the number of playings each record has had. Each time the record has been played one of the 0's can be fillled in. When all 0's are filled in, it is time to discard the record.

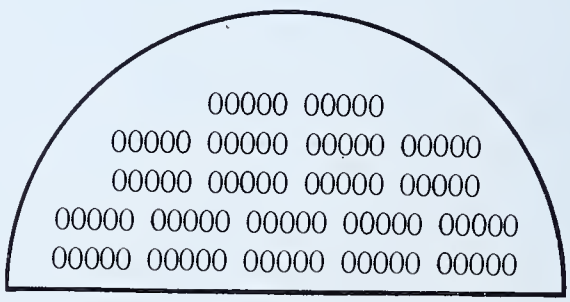


Figure 4. A Device for Keeping Count of the Number of Playings a Record Has Had

A copy of this form can be attached to the upper half of the middle of the record, so the identification number of the record is not covered. A supply of these labels will be found in the audiometer. If these should be exhausted, others may be obtained by writing to the Division of Special Education of the Department of Public Instruction in Harrisburg.

Test record KS-6839, which produces the buzzing sound used only to check the earphones, is furnished by the Department of Public Instruction and it is to be found in the record case on the inside of the audiometer cover.

3. Have a supply of small blotters on hand which can be placed under the test sheets to muffle the sounds of the pencils. At least forty blotters will be needed. A good supply of sharpened pencils for emergency use is also essential.

4. An adequate supply of the following forms should be assembled before the testing is begun. Copies of the forms are included in the Appendix.

a. A sufficient number of AUDIOMETER TEST SHEETS, Form PISE 10, for all three tests, should be mimeographed. The number of sheets needed is approximately 25 per cent more than the total enrollment in the grades to be tested. The additional history usually included on the test sheets is omitted since more detailed information on those children who show losses will be collected later.

b. A supply of Audiometer Form PISE 11, TEST RECORD AND FOLLOW-UP SHEET should be available for recording the scores of those pupils who do not make satisfactory scores on the first test. A safe estimate is one which allows space for recording the names of 20 per cent of the pupils who are to be tested. Form PISE 11 is furnished by the Department of Public Instruction. Instructions for obtaining these forms are included in this bulletin in the section under the heading, "FORMS" on page 43.

c. It is suggested that copies of Form PISE 16, REPORT ON AUDIOMETER TESTS, be obtained and studied before the testing program begins in order that all data necessary for reporting the tests can be gathered in the process.

d. If teachers are to assist in scoring the tests, copies of the instructions for scoring and extra keys should be made. Keys for records KS-6090 and KS-6091 are printed on the inside surface of the cover on the record compartment of the audiometer. A key for record KS-10087 is glued on the inside cover of the audiometer. Copies of all keys are included in the Appendix of this bulletin.

e. If a district does not wish to mimeograph its own supply of test sheets and keys it may purchase them from the Graybar Company at the addresses given on page 26. The test sheets are sold in lots of five hundred (500). The keys are sold in packages of five (5). Information necessary for ordering these supplies is given below.

Article	*Order Number*	*Price*
Test Sheets for Records KS-6090 and KS-6091	ESL-614217-1	$2.65
Key for Record KS-6090	ESO-614216-1	.55
Key for Record KS-6091	ESO-614216-2	.55
Test Sheets for Record KS-10087	ESO-677650-1	2.65
Key for Record KS-10087	ESO-677651-1	.75

Conference With Principals

It is hard to conceive of a successful testing program being carried out without having first cleared all details of the general organization with the principals of the various schools. At least a week before the actual testing begins, it is wise to arrange an interview with the indi-

vidual in charge of each building. The following items are some concerning which the tester and the principals should have an understanding:

1. Selection of a quiet room for testing.
2. Reduction of hall traffic during testing.
3. Arrangement for the quiet dismissal of the lower grades during the intervals between tests.
4. Synchronization of the testing schedule with the system of bells and class dismissals.
5. Schedule for a common recess period for all rooms in grade buildings during which time testing can be discontinued.
6. Consideration of the advisability of having monitors in the halls during the tests.
7. Precautions for maintaining reasonable quiet in the rooms adjoining the testing room.
8. Arrangement of quiet activities for classes in gym, shop, music, any typing which might otherwise disturb the testing.
9. Advisability of closing doors and windows of all classrooms during the testing.
10. Availability of two or more older pupils to act as assistants to the tester.
11. Merits of having the teachers of the various grades accompany their children to the testing room and remain there during the test.

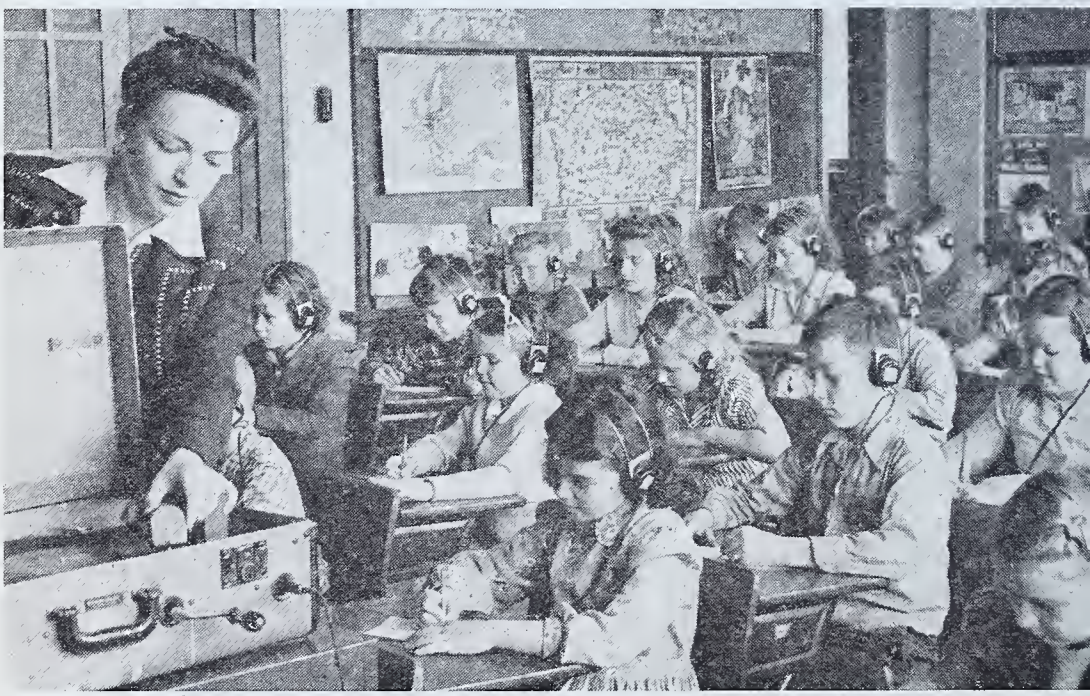


Figure 5. The Multiple Audiometer Test

12. Means for informing both teachers and pupils of the general plan of the program and the necessity for cooperation.
13. Decision on the responsibility for scoring tests and recording scores on health cards and Form PISE 11.
14. Provision for having pupils fill out identification material on test sheets before coming to the testing room.
15. Giving instructions for pupils to bring sharpened pencils to the testing room.
16. Possibility of moving the children to a quieter building for the second and third tests if disturbing noises cannot be controlled otherwise.
17. Plans for returning for the second and third tests, if the program cannot be completed in one day. A definite schedule for all three tests in the building should be agreed upon before the conference with the principal is terminated.

Grades To Be Tested

A screening test should be given to pupils as soon after they enter school as possible. Since children below the third grade do not seem to be able to respond satisfactorily to the multiple audiometer test, unless the monitor method is used, it is suggested that all in-coming third graders be tested each year. Thereafter, they ought to be tested every third year, which would mean that grades six and nine also would be tested. In most school systems it has seemed possible to test only one other grade in addition to the third. Whether this other grade is the sixth or the seventh depends upon local conditions or administrative organizations. If grades three and six are located in one building it is obviously most satisfactory to test the sixth grade along with the third when testing the seventh would necessitate packing the equipment and setting it up in another building. Testing the ninth grade is especially important where pupils from outside districts come in to attend high school.

Where only one grade can be tested annually the third grade should be selected. When two grades can be tested each year, the seventh or sixth grade should be tested in addition to the third. If three levels can be tested, grades three, six and nine should be included. Along with the selected grades to be tested each year the following pupils should be included:

1. Those who made unsatisfactory scores the preceding year.
2. Those who moved into the district within the preceding year.
3. Those who have had earaches or running ears during the preceding year.

Selecting a Quiet Room

As a rule a classroom on the top floor of a building and on the side which is farthest removed from sounds of traffic will be most desirable. The room should be away from shops, lavatories, gymnasiums and music

rooms. There is definite advantage in going to the testing room with the principal during the regular day, when sources of noise can be studied with the view to eliminating as many of them as possible.

Rattling windows and escaping steam are common hazards, especially in the winter months. The windows can be quieted, ordinarily, by tightening the latches or by forcing wedges of folded paper into cracks around the frames. A simple sound trap can be made by fastening a thick wad of cotton or loose cloth around leaking valves or radiator connections. Heavy winds or rain may necessitate postponing the tests.

In areas where industrial plants or other uncontrollable sources of sound constantly maintain high noise levels, it will be wiser to not attempt to test hearing, since the results cannot be considered reliable. In many such cases it will be possible to do the testing in a church or in another school building some distance away. Following the general plan of testing only the third and seventh grade pupils, the problem of getting children to a different building is not insurmountable.

Setting Up the Equipment

The importance of having everything in readiness for the actual testing before the children arrive on the scene cannot be too strongly emphasized. The confusion resulting from last-minute, hurried preparations may seriously handicap the project.

When an audiometer is brought in from the cold, do not wind the motor until it has been in the warm room for some time. By leaving the testing of the earphones as one of the last operations in the preparation for the test, ample time will be allowed for the adjustment to room temperatures.

The audiometer case should be placed on a level desk or table top. The trays and earphones should be distributed so that each seat may be approached by an aisle which is not blocked by cords or trays. Placing the receiver trays on inverted waste paper baskets will encourage the use of the clear aisles by the children. The cords which connect the trays will have to cross the clear aisles. If these cords are stretched tightly along the floor, and weighted by books, chances of tripping over them will be reduced.

Blotters to be placed under the test sheets, and the receivers should be laid out on the tops of the desks in a neat, uniform manner. Although the children are usually requested to bring sharpened pencils to the testing room, it is suggested that an additional sharpened pencil be placed on each desk, to be used in case of emergency.

Before each test the earphones should be wiped with gauze which has been dampened in alcohol. This can be accomplished with little delay if older pupils are used as assistants. Do not attempt to wash out the openings in the receivers. Care must be exercised to prevent drops of alcohol from running into the holes. Be sure that fragments of gauze do not collect in the openings in the receivers.

Children who have running ears at the time of the test need not be included, since they have already demonstrated their need for referral procedures. Children who have open sores or skin diseases should not

be tested unless extra precautions are taken to wipe the earphones, the wire, and the headbands with gauze dampened in alcohol after they have been used by these pupils. The classroom teacher or the school nurse should determine who these children are before they report to the testing room.

The diagram given in Figure 6 is suggested for use in explaining the tests to the children. There is an advantage in having it drawn neatly on the board before the pupils come in.

	Right Ear				Left Ear				
Hearing Score	1	2	3	4	5	6	7	8	Hearing Score
30									30
27									27
24									24
21									21

Figure 6. Diagram for Explaining the Test

To test the earphones play the test record, No. KS-6839, and proceed rapidly from one seat to another, listening to the response of each earphone. If a phone has a weakened output or does not work at all, mark it by tying a cord around it and avoid using it until it can be adjusted.

The regulator controlling the speed of the turntable is not always reliable, so before each day's testing it is well to check the speed. This may be done by dampening a small piece of paper and pressing it on the outer surface of Test Record KS-6839. Then wind the motor, release the spring, and after the turntable reaches maximum speed, place the playing arm on the record. Count the number of times the paper passes the controlling lever per minute. The record should make eighty (80) revolutions per minute.

Next wind the motor again, insert a new needle, place the digit record on the turntable, and the preparations are complete.

Preparations should be so complete that the person in charge can give full attention to controlling the testing situation. Meet the pupils at the door, admitting them slowly enough so that there is no rushing for seats. Direct them to the proper aisles and make them feel from the start that you have the situation well in hand.

After one group has been dismissed, arrange any cords that have been moved and wipe off the faces of the earphones with gauze dampened in alcohol; place the blotters, new test sheets and earphones on the desks in a uniform, neat manner just as they were arranged for the first group; sharpen broken pencils and make replacements. In general, have things as much in readiness for the second and subsequent groups as they were for the first group.

Procedure for Testing

The procedure for testing as given below is written for use with either the three-digit record, KS-6090, or the two-digit record, KS-6091. Alternate statements for the three-digit record are placed in parentheses. The procedure to be followed with the newer two-digit record, KS-10087, is given on page 34. It is assumed that the identification material at the top of the test sheet has been filled out before the pupils report to the testing room. The person in charge of the testing must remain alert and watchful throughout the whole procedure. To assure this alertness he should wear an earphone during the actual testing situation.

The directions must be followed exactly, the parts in capital letters being read aloud, and the activities described in the small letters followed in detail and in the given sequence. Impromptu approximations of these directions are not to be used. To give maximum clarity to the instructions, practice reading them aloud before each day's testing.

1. PROCEDURE FOR TESTING WITH RECORDS KS-6090 AND KS-6091

When the pupils are seated, read the following instructions aloud:

"WE ARE GOING TO FIND OUT HOW WELL YOU CAN HEAR. IN A FEW MINUTES WE ARE GOING TO PUT ON THE EARPHONES AND THE TEST WILL BEGIN. YOU WILL HEAR A VOICE SAYING, 'YOU ARE GOING TO HAVE YOUR HEARING TESTED. LISTEN CAREFULLY, AND WRITE THE NUMBERS YOU WILL HEAR IN THE FIRST COLUMN.' THE FIRST NUMBERS YOU WILL HEAR ARE 5-4 (5-2-6) AND YOU WILL WRITE 5-4 (5-2-6) IN THE FIRST COLUMN."

Write the numbers in the proper column of the diagram (Figure 6) on the board.

"WRITE THOSE NUMBERS ON YOUR PAPERS AS I HAVE WRITTEN THEM ON THE BOARD."

Go down alternate aisles quickly to see that each pupil has written the numbers in the proper space.

"THE NEXT NUMBERS YOU WILL HEAR ARE 4-1 (3-4-8)."

Write these numbers in the second space in the first column of the diagram on the board.

"NOW WRITE THOSE NUMBERS ON YOUR PAPERS."

Go down alternate aisles again to see that the pupils have written the numbers in the proper spaces.

"THE VOICE WILL GIVE YOU OTHER NUMBERS, TWO (THREE) AT A TIME, AND YOU WILL WRITE THEM ON YOUR PAPERS. AS YOU LISTEN, THE VOICE WILL BECOME SOFTER AND SOFTER AS THOUGH THE PERSON

WERE MOVING FARTHER AND FARTHER AWAY. IF YOU HEAR ONLY A PART OF THE NUMBERS, FOR EXAMPLE, IF THE VOICE SAYS, '3-1', AND YOU HEAR ONLY THE 3, WRITE THE 3 DOWN. IF YOU DO NOT HEAR THE NUMBERS CLEARLY ENOUGH TO WRITE THEM, LEAVE A SPACE AND WRITE THE NEXT NUMBERS YOU HEAR IN THE SPACE BELOW."

"NOW PLACE YOUR BLOTTER UNDERNEATH YOUR TEST SHEET WITH THE SOFT SURFACE UP. WE ARE GOING TO TEST THE RIGHT EAR FIRST. TAKE THE EARPHONE IN THE RIGHT HAND, KEEPING THE CORD AT THE BOTTOM OF THE RECEIVER. PLACE THE SIDE OF THE RECEIVER WITH THE HOLES OVER THE RIGHT EAR SO THAT THE HOLES IN THE EARPHONE ARE OVER THE OPENING OF YOUR EAR. THE GIRLS WILL HAVE TO PUSH THEIR HAIR BACK BEHIND THE RIGHT EAR. PLACE THE WIRE HOLDER OVER YOUR HEAD TO HOLD THE RECEIVER IN PLACE."

Inspect the placement of each earphone and then put on your own earphone.

"NOW WE ARE READY TO BEGIN. DO NOT MAKE ANY NOISE AS IT WILL MAKE IT HARD FOR YOU TO HEAR THE NUMBERS. DO NOT WRITE UNTIL YOU HEAR THE THIRD SERIES OF NUMBERS BECAUSE YOU HAVE ALREADY WRITTEN THE FIRST TWO SERIES ON YOUR PAPERS."

Release the spring, place the playing arm on the record, and close the lid of the audiometer, standing by until the first side of the record has been played. Then stop the motor.

"TAKE YOUR EARPHONE OFF AND LAY IT ON YOUR DESK. WE WON'T START TO TEST THE LEFT EAR RIGHT AWAY. DON'T WRITE ON YOUR PAPERS UNTIL WE ARE READY TO BEGIN AGAIN."

Wind the motor of the audiometer, change the needle, and turn the record over.

"NOW WE ARE GOING TO TEST THE LEFT EAR. PLACE THE EARPHONE ON THE LEFT EAR JUST AS YOU PLACED IT ON THE RIGHT EAR."

Inspect the placement of each earphone and then put on your own earphone.

"WRITE THE NUMBERS YOU HEAR NEXT IN COLUMN FIVE."

Indicate column five on the diagram on the board. Start the motor, and close the audiometer lid. When the record has been played, stop the machine.

"PLACE YOUR EARPHONES ON YOUR DESKS. PASS YOUR PAPERS TO THE FRONT OF THE ROOM. YOU WILL BE DISMISSED ONE ROW AT A TIME."

Dismiss the children, one row at a time, directing each row through the unobstructed aisles. Mark the record to indicate that it has had another playing.

2. PROCEDURE FOR TESTING WITH RECORD KS-10087

When the pupils are seated, read the following instructions aloud.

"WE ARE GOING TO FIND OUT HOW WELL YOU CAN HEAR. IN A FEW MINUTES WE ARE GOING TO PUT ON THE EARPHONES AND THE TEST WILL BEGIN. YOU WILL HEAR A LADY'S VOICE SAYING NUMBERS, TWO AT A TIME AND YOU WILL WRITE THOSE NUMBERS IN THE COLUMNS ON YOUR PAPERS. YOU WILL FIRST HEAR HER SAY, 'WRITE THE NUMBERS THAT YOU HEAR IN THE FIRST COLUMN ON YOUR PAPER.' THE FIRST NUMBERS YOU WILL HEAR ARE 4-2 AND YOU WILL WRITE 4-2 IN THE FIRST COLUMN."

Write the numbers in the proper column of the diagram on the board.

"WRITE THOSE NUMBERS ON YOUR PAPER AS I HAVE WRITTEN THEM ON THE BOARD."

Go down alternate aisles quickly to see that each pupil has written the numbers in the proper space.

"THE NEXT NUMBERS YOU WILL HEAR ARE 3-2."

Write these numbers in the second space in the first column on the diagram on the board.

"NOW WRITE THOSE NUMBERS ON YOUR PAPERS."

Go down alternate aisles again to see that the pupils have written the numbers in the proper spaces.

"THE VOICE WILL GIVE YOU OTHER NUMBERS, TWO AT A TIME, AND YOU WILL WRITE THEM ON YOUR PAPERS. AS YOU LISTEN THE VOICE WILL BECOME SOFTER AND SOFTER AS THOUGH THE LADY WERE MOVING FARTHER AND FARTHER AWAY. IF YOU HEAR ONLY A PART OF THE NUMBERS, FOR EXAMPLE, IF THE VOICE SAYS '3-1' AND YOU HEAR ONLY THE 3, WRITE THE 3 DOWN. IF YOU DO NOT HEAR THE NUMBERS CLEARLY ENOUGH TO WRITE THEM, LEAVE A SPACE AND WRITE THE NEXT NUMBERS YOU HEAR IN THE SPACE BELOW."

"NOW PLACE YOUR BLOTTER UNDERNEATH YOUR TEST SHEET WITH THE SOFT SIDE UP. WE ARE GOING TO TEST THE RIGHT EAR FIRST. TAKE THE EARPHONE WITH THE RIGHT HAND, KEEPING THE CORD AT THE BOTTOM OF THE RECEIVER. PLACE THE SIDE OF THE RECEIVER WITH THE HOLES OVER THE RIGHT EAR SO THAT THE HOLES IN THE EARPHONE ARE OVER THE OPENING OF YOUR EAR. THE GIRLS WILL HAVE TO PUSH THEIR HAIR BACK BEHIND THE RIGHT EAR. PLACE THE WIRE HOLDER OVER YOUR HEAD TO HOLD THE RECEIVER IN PLACE."

Inspect the placement of each earphone and then put on your own earphone.

"NOW WE ARE READY TO BEGIN. DO NOT MAKE ANY NOISE AS IT WILL MAKE IT HARD FOR YOU TO HEAR THE NUMBERS. DO NOT WRITE UNTIL YOU HEAR THE THIRD SERIES OF NUMBERS BECAUSE YOU HAVE ALREADY WRITTEN THE FIRST TWO SERIES ON YOUR PAPERS."

Release the spring, place the playing arm on the record, and close the lid of the audiometer, standing by until the first side of the record has been played. Then stop the motor.

"TAKE THE EARPHONE OFF AND LAY IT ON YOUR DESK. WE'LL HAVE A LITTLE REST BEFORE TESTING THE LEFT EAR. DON'T WRITE ON YOUR PAPERS UNTIL WE ARE READY TO BEGIN AGAIN."

Wind the motor of the audiometer, change the needle, and turn the record over.

"NOW WE ARE GOING TO TEST THE LEFT EAR. PLACE THE EARPHONE ON THE LEFT EAR JUST AS YOU PLACED IT ON THE RIGHT EAR."

Inspect the placement of each earphone and then put on your own earphone.

"WRITE THE NUMBERS YOU HEAR IN COLUMN FIVE."

Indicate column five on the diagram on the board. Start the motor, and close the audiometer lid. When the record has been played, stop the machine."

"PLACE YOUR EARPHONES ON YOUR DESKS. PASS YOUR PAPERS TO THE FRONT OF THE ROOM. YOU WILL BE DISMISSED ONE ROW AT A TIME."

Dismiss the children, one row at a time, directing each row through the unobstructed aisles. Mark the record to indicate that it has had another playing.

Emergency Situations

Interruptions may be handled in various ways. The first thing for the tester to do is to make some decision as to whether an interruption will be brief or whether it will probably last for some time. For a brief interruption it is best to continue the test, while for a longer interruption the audiometer should be stopped.

If a temporary distraction comes in while the recorded voice is repeating the number near the top of a column it may usually be ignored. If a disturbance occurs while the numbers near the bottom of a column are being repeated, it will, ordinarily, be a safe precaution to play the critical part of the record over after that side of the record has been played through. By wearing an earphone during the test, the examiner can judge whether or not there has been a significant interference, and he can indicate on a test sheet the columns and the sound levels affected by such interference. If only parts of one or two columns are affected it will not be necessary to replay the whole side of a record. By examining the record from an angle the beginning of each column can be located accurately by the difference in the grooves, and the tester can place the needle at the beginning of any column he may choose.

When it appears that an interrupting sound will last for a minute or more it is best to stop the audiometer. After quiet has been restored the tester may either play the whole side of the record again or start at the beginning of the interrupted column. A test cannot be continued by simply starting the motor and allowing the playing arm to remain on the record at the point of interruption, since the turntable gathers speed slowly and the numbers repeated while the speed is reduced will not be intelligible.

In instructing the pupils in how to proceed after an interruption, allow them to make corrections in any numbers they hear for a second time. It is better to have them write over wrong numbers than to make erasures, because of the time element. Then continue with the test in the usual way. Pupils should always be told just which column is being replayed and which numbers they will hear a second time, since otherwise they may write numbers in wrong spaces and thus confuse the testing picture.

Testing Young Children and Retarded Children

Hearing tests are apt to have less reliability with young children than with the older ones, consequently it is suggested that extra precautions be taken in administering the tests to them. It has been found to be especially helpful to let the third grade children listen to one complete side of the record through the earphones before requiring them to write the numbers. Most people prefer to test fewer of the young children at one time. It is inadvisable to attempt to take more than twenty at once, and many experienced nurses take only ten or twelve.

The monitor method should be used in administering the third test to the young children. By this method the tester trains the child to

whisper the numbers he hears through the receiver. Some people write the numbers which the child whispers on a test sheet and score the sheet later. A simpler way is to follow the key as the child whispers, indicating only errors and omissions on a test sheet. If the child's responses indicate hearing at the zero level in one column, it is not necessary to test that ear further.

The monitor method should be used for the third test with children who are either mentally retarded or crippled so that writing is difficult for them. It should also be used for first and second tests on children who are below the third grade, since experience has proved that they are not able to respond well by the usual method.

Never slow up the record for tests with young or retarded children. Varying the speed of the machine invalidates the test. The sound coming through the receiver increases as the speed of the turntable increases. Consequently, slowing up the turntable handicaps the children because it makes the sounds too faint to be heard.

Modified Testing Procedure for Rural Schools

Although as a regular procedure the Department recommends that the audiometer be used to test the hearing of children in the third and seventh grades each year, some modifications are justifiable in cases of small rural buildings where it is not practical to test small numbers of third and seventh graders each year. The following suggested practice will permit the completion of all tests for all children in a rural building in one visit. The number of such schools within an area can be divided into three groups and one of the three groups can be tested each year. By such a schedule the person in charge of the testing will return to a building once every three years.

On arriving at a school building it is advisable to arrange for a recess of all of the children except two or three of the older pupils who will assist the examiner in setting up the equipment. When everything is in readiness for the test, the children may be readmitted, a few at a time, so that they can find their seats without disturbing the wires. Allowing first and second grade children to have earphones when there are enough to go around, even though their papers cannot be considered seriously, helps in maintaining order.

Before testing unsophisticated children of mixed ages in rural areas, it has been especially helpful to have them hear one complete side of the record through the earphones. Otherwise the test is administered in the routine manner. Once the test is completed another recess may be called for all of the pupils with the exception of those who helped to set up the equipment and an additional group of children who are mature enough to assist in the correction of test papers. Those who distributed the earphones may then begin to place them back into the trays. The other pupils who were retained and the teacher may be instructed in how to correct the test sheets, indicating omissions by hyphens and wrong numbers by drawing diagonal lines through them as the correct numbers are being read aloud. After the examiner has

corrected one set of papers with the pupils, he may have the teacher read out the numbers from that point on so he can be free to reassemble his materials.

Once the papers have been corrected it is possible for the examiner to score them within a few minutes' time. The expectancy is that no more than one or two pupils in one building will show defective hearing by the first test. Instead of administering the retests by the usual method, it is most practical in this situation to complete these tests using the monitor method. In many rural schools these tests by the monitor method can be made in a cloakroom, on the front steps of the building or on the ground a short distance from the building. On colder days it is possible to set the audiometer on the ground beside a car and have the glass of one of the doors of the car rolled down just enough to permit the cord of one receiver to pass through. The examiner can then start the audiometer and administer a monitor test while sitting in the car with a pupil. A carefully administered test by the monitor method is as acceptable as two retests in which the pupils write the numbers.

It is possible, ordinarily, to finish with all of the hearing tests in a building and to instruct the teacher in the way to record the test results on the health cards in a little more than an hour's time. Explaining the bulletins for follow-up work with children whose tests indicate impaired hearing will, of course, take longer. When the examiner plans to make home visits there is merit in calling on families immediately after the tests have been completed.

Evaluating Tests

Determining the efficiency of the hearing from the test sheets may be divided into two separate tasks: correcting the papers, and scoring them.

Correcting the papers is time-consuming, but it is simple enough so that older pupils can help with it. An arrangement which is satisfactory is to test the pupils in the third grade first and then to proceed to test the older pupils. The last group of older pupils can be used to correct the papers of all previous groups while the nurse or teacher reads the numbers from the key. Having the one group correct the test sheets for all other groups saves time since the instructions do not have to be repeated, and the pupils are able to work much more rapidly on the second and third sets of papers. The following directions are suggested for the pupils:

1. Draw diagonal lines through incorrect numbers. Where both numbers of a pair are incorrect draw a separate diagonal line through each number.
2. Draw a small line or a hyphen to indicate the omission of a number. When two numbers of a pair are omitted draw two hyphens.
3. If a pupil omits a pair of numbers but does not leave a space, make two hyphens immediately above the two misplaced num-

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF PUBLIC INSTRUCTION
Division of Special Education
Harrisburg

AUDIOMETER
TEST SHEET

NAME .....
AGE .....
GRADE .....
DATE .....

Do not make any noise as it will spoil the test

INSTRUCTIONS

YOU WILL HEAR NUMBERS SPOKEN BY A PERSON WHO IS MOVING AWAY FROM YOU. THE VOICE WILL GET WEAKER AND WEAKER. LISTEN CAREFULLY AND WRITE AS MANY NUMBERS AS YOU CAN.

Hearing Score	1	2	3	4	5	6	7	8	Hearing Score
30	42	22	34	41	65	55	43	11	30
27	32	24	86	56	68	32	55	42	27
24	41	55	85	44	56	58	—	41	24
21	86	34	41	24	23	-8	68	85	21
18	58	23	65	58	42	65	14	22	18
15	23	85	68	22	22	44	65	65	15
12	65	86	11	85	14	32	58	23	12
9	1-	41	56	23	58	86	41	58	9
6	56	65	32	86	85	14	22	86	6
3	86	-8	-3	—	4-	-1	85	32	3
0	23		15	65		23	11	56	0
-3	6-			-4		-8	-1	14	-3
			-3					-3	
	Hearing Score					Hearing Score			

Write a "yes" or "no" in answer to the following questions:
Do you have a cold today .....? Do you have a sore throat today .....?
Do you have a running ear .....?

PISE 10
1—42

Figure 7. Example of Scored Test Sheet

bers which are written in the square that should have been left blank. Succeeding numbers in that column are counted as correct, if they are properly written, even though they are not in the proper spaces. (See column 2 in Figure 7.)

4. If numbers at any level are reversed, but are otherwise accurate, they are credited as correct.

An exact manner for scoring test sheets has never been worked out on an experimental basis. Nevertheless, there is an absolute need for uniformity, and although the following instructions cannot be given as the only way to determine hearing scores, they represent an entirely defensible method. They should, for the sake of uniformity, be used in connection with the State program.

1. The hearing score for an ear is based upon the lower level of the longest unbroken column for that ear. A column is unbroken if both digits of each series are written correctly. Thus column 8 in Figure 7 is unbroken to the -3 level, and the hearing score for the left ear is -3, regardless of the other three columns for that ear.
2. A column is also considered unbroken when only one of the two digits is written correctly at any level, if one other digit is correctly written at that same level in any other column for that ear. Column 1 in Figure 7 can be considered unbroken down to the -3 level. Even though one digit is omitted at the 9 level and one digit is wrong at the 3 level, numbers are correctly written in other columns at both of these levels. Credit is given for hearing at the -3 level because one other number, the 4 in column 4 is written correctly at that level.
3. Column 4 is broken at the three level by the omission of both numbers. If column 4 were the best column for the right ear, the hearing score would be 6 since you cannot go below a column which is completely broken by two wrong numbers, two omissions or one wrong number and one omission. Column 6 is also completely broken at the 3 level for that same reason.

When it is necessary for a nurse to correct some of the test sheets it will not usually be necessary to correct all four columns for each ear. As soon as one column is found which indicates normal hearing (a score of 6 sound units or less) that score can be recorded for that particular ear, and the nurse can proceed to the consideration of the test on the other ear.

Re-tests

Experience shows that about one-half of those who fail the first test will earn satisfactory scores on a second test. Failure to understand directions and excitement are two of the factors accounting for the variation. It is, therefore, recommended that no medical referrals or drastic classroom adjustments be made without a second and third test.

All those who earn scores of nine (9) or more in one or both ears on the first test should be given a second test. Those who earn scores of nine (9) or more in one or both ears on the second test should be given a third test. From two to five per cent of those who take the first test will ordinarily earn scores of nine (9) or more on the third test. If the number screened out on the third test is greater than five per cent, the tester should make a careful analysis of his program in order to account for the unusual number.

While there might be some possible advantage in having an interval of a week or two between any two of the three tests, practical considerations of the effort involved in returning to a building and setting up and putting away the equipment a second time argue against it. The program is less cumbersome if the tests are given in rapid succession in one day so the work in a building is completed before the audiometer is taken away.

Critical Losses

Pupils should not be assumed to have critical losses on the basis of one multiple audiometer test alone. Two retests using the usual pencil and paper method or one careful retest by the monitor method is necessary to confirm the results of the first test. A loss of nine (9) sound units or more by the multiple audiometer is considered a critical loss. The retests can also be given with the discrete frequency audiometer. Critical losses on retests with individual audiometers are determined in accordance with the instructions given on page 19.

Packing and Carrying

The audiometers should be considered as equipment which has been loaned by the State Department of Public Instruction. Individuals who have these audiometers temporarily in their charge should feel obligated to take all necessary precautions to prevent undue shortening of the period of usefulness of this equipment. The following suggestions for the packing and carrying of the machines should be borne in mind:

1. Each day when you are through testing allow the motor to run down and then secure the turntable for travel by setting the small lever used to start and stop the motor.

2. To pack the receivers, hook the free ends of the head bands over the metal cross bars immediately above the earphones as illustrated on the Direction Sheet on the inside of the record case of the audiometer. Next, remove all kinks of sharp bends in the wires. Then place the receivers in the tray, face downward. Coil the doubled cords into loose rolls, inserting these rolls between the pairs of wires of the head bands. Fold the extension cords into the space between the two rows of receivers.

3. Place the phonograph records in their paper envelopes and put them in the record case on the inside of the cover of the audiometer. Put crumpled paper or cloth inside of the record case before closing it to cushion the records during travel.

4. Remove the needle from the pick-up arm and tighten the set screw. Be sure that the pick-up arm rests securely on the post provided for that purpose.

5. Do not carry test sheets or any other accessory materials inside of the audiometers.

6. When transporting the machines by automobile, fit them between the seats so as to minimize shifting and jarring. If the equipment is

carried in the trunk of an automobile, lay the cases flat on the floor rather than on any loose tools. Protect the cases with a robe or cardboard covering, making some arrangement to prevent shifting and undue jarring.

7. Do not leave audiometers in unheated or damp places. Store them in dry, heated rooms, not too close to radiators.

Transportation of Audiometers

If at all possible automobile transportation should be arranged for the audiometers. When they must be shipped they should be placed in cardboard cartons, since the unprotected cases are invariably damaged in transit. A convenient procedure is to save the cartons in which the equipment is expressed from Harrisburg. Audiometers which are shipped should be insured for $180 and the tray of receivers for $200.

Adjustments and Repairs

The audiometers are lubricated and the energy output is checked before they are released from the Department of Public Instruction. Under ordinary circumstances they will not offer trouble for the duration of a school year. As soon as a testing program has been completed, the audiometer should be returned to Harrisburg for servicing. At the end of the school year all audiometers should be sent to Harrisburg with the exception of those which are kept by special arrangement for use in pre-school clinics or summer programs.

If a receiver is not working, loosen the cap by twisting it a quarter turn in the counter-clockwise direction, and then tighten it again. If it does not work properly after this, remove the cap and examine the diaphragm for dents, dirt, or breaks. If the diaphragm is defective, replace the cap and tag the receiver so it will not be used in testing. In the meantime, write to the Division of Special Education in the State Department of Public Instruction for diaphragms to replace defective ones. If a whole tray of receivers is not working clean the plug with Bon Ami and try them again. If they still do not work, pack the tray carefully and return it to the State Department of Public Instruction for repair.

When little or no sound at all comes through the receivers or when the recorded voice takes on a peculiar quality making it sound like the speech of a person with a great deal of mucus in his throat, the probability is that the pick-up head is out of adjustment. In such a situation the pick-up head should be removed, wrapped carefully, and sent to the Division of Special Education in Harrisburg. A letter or wire should also be sent explaining the difficulty. On receipt of the letter or wire a new pick-up head will be sent from the Harrisburg office immediately to replace the defective one. The pick-up head is removed by unscrewing the bolt just behind the place where the pick-up head is attached to the playing arm. There is an ordinary slip connection by which the wires leading from the pick-up can be detached.

If an audiometer has had considerable use, the motor may become noisy and it should be returned to Harrisburg for repair, or a district

may, at its own expense, have the motor oiled and greased by a local radio repair man who will agree to follow the directions given below, and attempt nothing more than suggested in the following statement.

First remove the motor crank by turning it in a counterclockwise direction; then take out the eight screws, two at each side, which secure the motor panel to the case. It is then possible to raise the panel and gain access to the motor. All gears should be lightly greased with petroleum jelly and all bearings oiled with light spindle oil. Particular attention should be given to the governor to insure that the brass of disc has a light coating of grease on the side that rubs against the loose governor shaft. There should be practically no end-play between the governor shaft and its pivot bearings, but it should turn freely. To remove any end-play, loosen the screw holding the brass pivot bearing at the end opposite the brass disc and slide the bearing in until the excess clearance is removed.

Under no circumstances should local districts sponsor repairs or replacements other than specified above without first receiving authorization from the Division of Special Education of the State Department of Public Instruction. The plan is to keep an audiometer which is in good working condition in the office, wrapped and ready to send out immediately on receiving a wire, telephone call or letter from the field. The defective machine should be returned to Harrisburg as soon as possible.

F. ROUTINE ITEMS WHICH APPLY TO ALL HEARING TESTING PROGRAMS

Forms

The following forms are suggested for use in connection with the testing program. With the exception of the forms on which the individual test results are recorded, all of them are so constructed that they can be used regardless of the technic or equipment. Copies of all forms are included in the Appendix.

1. Form PISE 10, AUDIOMETER TEST SHEET, is used only by pupils who are tested with multiple audiometers.

2. Form PISE 11, TEST RECORD AND FOLLOW-UP SHEET, is used to record the names of pupils who show critical losses by the audiometer tests. Spaces are provided for indicating the hearing for each ear by the original test and two re-tests, in event the response of the particular case or the technic makes re-tests advisable.* Numerical scores for hearing are recorded when the multiple audiometer is used. Results of tests made by the discrete frequency audiometer are indicated simply by writing an "N" for an ear showing normal hearing and an "L" for an ear showing a critical loss. Spaces are provided at the right of the form to serve as a check sheet or progress record of follow-up procedures. The follow-up procedures, which are alike for all technics are outlined on page 45 of this bulletin.

*Two re-tests are absolutely essential with the multiple audiometer. At least one is necessary with the discrete frequency screening test.

3. Form PISE 12, BULLETIN TO THE TEACHERS, is given to all teachers of pupils whose audiometer tests indicate a critical hearing loss for one or both ears.

4. Form PISE 13, the suggested letter to the parents, should be sent to the parents or guardians of children whose hearing tests indicate critical impairments. The content of the letter is not definitely specified, being included for its suggestive value.

5. Form PISE 14, BULLETIN TO THE PARENTS, is either sent or given to the parents of children who have impaired hearing.

6. Form PISE 16, REPORT ON AUDIOMETER TESTS, is filled out at the time of the completion of the tests in a school or district. One copy should be sent to the Division of Special Education in the State Department of Public Instruction in Harrisburg. Other copies may be retained for local files. The essential value of this form is that it provides an organization for testing data by which an estimate of the satisfactoriness of the functioning of the equipment as well as the use made of it in the field can be made.

7. Form PISE 17, REPORT OF FOLLOW-UP ON HEARING CASES, will be sent out only on special occasions from the Division of Special Education of the Department of Public Instruction to schools which have used the audiometers in order to get information on the extent as well as the effectiveness of the follow-up work. As is the case with Form 16, one copy is sent to the Division of Special Education. Others may be kept for local files.

8. Form PISE 18, THE AUDIOGRAM, is used to record individual threshold tests or screening tests with the discrete frequency audiometer. Form 19 is preferred for this purpose unless only one test is to be made on a case. Form PISE 18's are useful when copies of test results are furnished to cooperating medical or educational agencies.

9. Form PISE 19, HEARING RECORD, provides spaces for the numerical recording of a series of threshold tests either by air conduction or bone conduction, with or without masking. Discrete frequency screening tests can be recorded on this same form.

Forms PISE 11, 16 and 17 are furnished by the Department of Public Instruction. Forms PISE 12, 13, 14, 18 and 19 are supplied by the local districts, although the Department does furnish sample copies for duplication by the schools. Forms furnished by the Department are available through the County Supervisors of Special Education or they may be obtained by writing directly to the Division of Special Education in the Department of Public Instruction.

Recording Scores on the Health Cards

The results of each year's tests should be recorded on the pupils' yellow Health Cards. The Health Cards have separate vertical columns for each ear, labelled "L" for left and "R" for right. There is a space to the left of the card in which the date of a test can be written. Normal hearing for an ear is indicated by printing an "N" (normal) in the

proper space. If an ear shows a critical loss an "L" (loss) is printed in the proper space, indicating the loss. No attempt is made to record the degree of hearing loss on the yellow cards. An "A" should be printed alongside the date of the test to indicate that the acuity was measured with an audiometer.

Follow-Up Procedures

The testing program in itself has merit. With the high incidence of hearing loss, it is reassuring to parents and teachers alike to know that their children show normal hearing acuity. Likewise, something definite has been accomplished when a test gives some indication of the presence of a hearing loss in a child, since this knowledge alone will result in certain adjustments at the hands of resourceful teachers and parents.

However, in probably every instance, the testing program is carried out with the idea of doing much more for the child than simply pointing out the presence of hearing impairment. The steps suggested below are a practical sequence of follow-up procedures which may be taken by the nurse or teacher who is in charge of a local program. A convenient check sheet for keeping track of the follow-up work completed with a child is provided on Form PISE 11, TEST RECORD AND FOLLOW-UP SHEET.

Step 1. The classroom teacher's attention should be called to children whose hearing tests indicate critical losses. The teachers are given copies of the BULLETIN TO THE TEACHERS and encouraged to show these children the considerations listed in the bulletin.

Step 2. The parents of children whose hearing tests indicate critical losses should be informed of the results of the tests. This may be accomplished by a visit from the nurse or teacher, or by a letter similar to the one suggested in Form PISE 14. The parents should be urged to seek medical advice on the hearing problems as well as to cooperate with the school in improving the general adjustments for hard-of-hearing children.

Step 3. Children whose audiometric tests indicate critical losses should be called to the attention of the school's medical examiner at the time of the physical examinations with the view to their getting additional attention. In many systems the medical examiners see all children selected by the audiometer program soon after the testing is completed.

Step 4. The person in charge of the testing should make some check on pupils in order to ascertain for which children the parents have provided medical examination or treatment.

Step 5. Referrals should be made to medical clinics wherever such facilities are available. It is an important function of a person who is in charge of a local or regional testing program to become acquainted with all hospitals or other agencies through which such services may be obtained.

Step 6. Children whose degree of impairment and poor school adjustment warrant such procedure should be referred for educational and psychological study. In district operating under County Superintendents of Schools this will mean referral to the County Supervisors of Special Education. In other districts such services are obtainable through local school psychologists or one of the approved psychological clinics which are listed on page 119 in the Appendix.

Further suggestions for follow-up procedure include the following:

1. The cooperation of school administrators, especially building principals, should be solicited in encouraging teachers to make reasonable adjustments for hard-of-hearing pupils in their classrooms.

2. Teachers should be encouraged to make use of the additional materials included in this bulletin as well as items suggested in the bibliography of the bulletin becoming better acquainted with the problems of children with impaired hearing. Such materials should be available in school libraries.

3. Speakers who can present the medical or educational aspects of hearing problems should be engaged to address meetings of teachers and parents.

4. Teachers in fourth class or rural districts should seek the cooperation of State nurses in obtaining medical help for children whose parents do not provide it.

5. Sixteen-year-old pupils whose hearing impairments will complicate their vocational adjustments should be referred to a representative of the State Bureau of Rehabilitation. The addresses of the regional offices of the Bureau and the areas in the State which each office serves are given on page 118 of the Appendix.

Part II of the Bulletin, The School Placement of the Acoustically Handicapped Child, contains detailed suggestions for the educational follow-up for children whose hearing is impaired.

PART II

THE SCHOOL PLACEMENT OF THE ACOUSTICALLY HANDICAPPED CHILD

POSSIBILITIES FOR the educational provision for children who have impaired hearing may be considered in terms of the following classification:

A. Adjustment within the regular classroom.
B. Adjustment within the regular classroom with additional help from a visiting teacher.
C. Adjustment within the classroom with part-time attendance in a hearing center.
D. Attendance in a special class for the deaf or the hard-of-hearing.
E. Attendance in a residential school for the deaf.

This listing may be interpreted in several ways. The given sequence represents the order in which the items would be given if they were arranged with reference to their appropriateness for classifications of handicapped children according to the severity of their losses, although individual consideration of the needs of particular cases will frequently violate this order. Because of the highly personal nature of each hearing problem, no really satisfactory statement of the degree of impairment which warrants a particular placement can be made. The following suggestions are furnished by the Committee on the Conservation of Hearing of the American Academy of Ophthalmology and Otolaryngology. They are in reasonable agreement with those accepted by most educators in this special field:

1. To remain in the regular classroom: Those whose losses are less than approximately 25 db. in the better ear for frequencies 512, 1024 and 2048 should be able to progress in the regular class if reasonable adjustments are made to them.
2. For lip reading: All those with permanent or progressive losses of approximately 25 db. in the better ear for frequencies 512, 1024 and 2048 or an average loss of 25 db. for these frequencies require instruction in lip reading.
3. For hearing aids: All those with permanent or progressive losses of approximately 35 db. in the better ear for frequencies 512, 1024 and 2048 or an average loss of 35 db. for these frequencies should be examined for fittings.
4. For special instruction in day schools or residential schools for the deaf: All those who fail to make normal educational progress with the assistance of lip reading, hearing aids, or both will need special school placement.

These recommendations need considerable interpretation but they do serve as a general guide.

Each of the possible ways of providing for deaf children is discussed below.

A. ADJUSTMENT WITHIN THE REGULAR CLASSROOM

Generally, it may be stated that whenever possible the child with a hearing loss should be educated in the regular classroom along with the normal children. Keeping him in the normal school situation, however, carries with it the responsibility for making reasonable adaptations which will enable him to achieve his best possible educational and social development. Obviously, if remaining in the regular classroom is to mean that he is neglected, this is the worst possible place for him.

The following items are important in successfully meeting the needs of hard-of-hearing pupils in the schoolroom:

Detection.—It is of primary importance that the teacher know which pupils in her room have impaired hearing. She should also know something of the degree of the impairment in each ear. For reasons stated earlier in this bulletin this information must be based upon careful audiometric tests. Determining a child's problem is the first and often the most important step in meeting his needs.

Seating.—The suggestion that a child with a hearing loss be seated near the teacher is so obvious and so frequently made that one is apt to minimize its importance. Actually, it is one of the most useful adjustments which can be made.

Persons with normal hearing are not good judges of the rate at which speech energy reduces as the distance from the speaker increases. While the average person is capable of hearing much more than is actually essential to understanding a speaker, no matter where he sits in an ordinary room, the heard-of-hearing person is constantly getting less than he should get to understand with ease. The subjective evaluation of the teacher with normal hearing should not influence her decision on the front seat placement of the child with a hearing loss. The actual sound energy which will reach the ears of the pupil will be multiplied many times if he is brought as close as possible to the speaker. There is no denying the physics of this item.

Whether or not the child is to be exactly in the front row or not depends a great deal upon the arrangement of the room. If a front seat is so close to the teacher that a pupil will be uncomfortable from trying to look almost directly up in order to watch the teacher's face, placement in the second or third seat may be wise. For the best results in lip reading a position no farther than ten feet from the speaker is desirable. If this distance is reduced, or at least not exceeded, it will be possible for the pupil to make the best use of his eyes and his ears in understanding speech.

A child who has normal or almost normal hearing in the better ear and a definite loss in the other will probably operate best in a corner

seat in the front of the room. His better ear should be toward the teacher and his classmates.

Lighting.—The child's position should be between the windows and the teacher, so that her features will be well lighted and not obscured by a bright glare behind her. The presence of a hard-of-hearing pupil in a room is an additional reason for paying attention to the lighting, since an adequate amount of light is necessary if he is to make good use of his eyes in getting ideas from others.

The Teacher's Position.—The teacher should attempt to give as much instruction as possible from a position which is near the child's regular seat. All assignments, explanations of new material, dictation, reading or telling of stories and blackboard work should be handled from that location. Facing the child is very important, and a special effort is necessary to see that when such things as blackboard drawings or maps are being discussed that she does not talk while her back is toward him. Other pupils should speak from this same position when giving reports or making other contributions which require some time.

Freedom.—It is advisable to give the hard-of-hearing child as much freedom as possible in adjusting his position in the classroom as the instructional routine changes. Such freedom will include turning around to watch the faces of other pupils who are reciting or moving about the room when the scene of instruction is shifted. He will need some guidance in this matter, but it will be to his advantage to help him develop skill in maneuvering positions which will be favorable for using his reduced hearing and watching speakers' faces.

Posture.—An individual whose hearing is reduced is often conspicuous because of postural habits developed as a result of the handicap. He may habitually thrust his head forward. A child who has better hearing in one ear than in the other, frequently develops a habit of turning his head to one side, thus encouraging an off-balance carriage. While a teacher cannot very well advise a pupil not to assume certain attitudes which apparently help him to hear, she may well discourage their becoming permanent. For instance, she may insist upon normal posture during study periods or she may, in some instances, take a more positive attack by talking his problem over with him or in certain cases by supervising remedial exercises.

Reading Lips.—The hard-of-hearing child should be encouraged to watch peoples' faces. Everyone, whether he has a hearing problem or not, develops a certain amount of skill in understanding speech through the clues he gets by observing speech movements. Consequently, the child who loses some hearing after he has learned to speak already has had a definite initiation to lip reading, even though he may not be conscious of it. To make use of this already acquired ability as well as to develop it further he will have to form the habit of watching speakers' faces. The handicapped child cannot be depended upon to develop this habit himself as a natural compensation for the impaired hearing. Ordinarily he needs a considerable amount of guidance in learning to watch the speech movements carefully.

Figure 8. Learning to Read Lips

Occasionally people become efficient lip readers without formal instruction. However, such exceptional cases do not reduce the urgency of help in developing this skill. The teaching can be given most efficiently by a specially trained person, but where such an individual is not available a person who does not have special training should not hesitate to attempt the job. Suggestions for such an effort are included in a later section on lip reading.

The Teacher's Speech.—Loud tones, exaggerated lip movements, or over-drawn gestures are frequently employed in an effort to be helpful to the hard-of-hearing child. These attempts are often so artificial as to be distracting to him. Ordinarily he finds it easier to follow a person who speaks naturally, with well modulated tones and clear enunciation.

It is difficult to read the lips of a high strung individual or one who has nervous mannerisms. The teacher who has a calm, deliberate way of speaking will have the most satisfactory speech for the pupil with a hearing loss.

Attention.—When a pupil has a severe loss it is usually necessary to get his attention before a new phase of instruction is begun. Left to his own resources he might be quite unaware of the shift in activity.

Assignments.—It is helpful if assignments can be given at the desk of the child with reduced hearing, using his books and materials to demonstrate what the class must do.

Fatigue.—There is a possibility of over-estimating the hearing efficiency of the hard-of-hearing child because when he pays close attention he appears to understand quite well. It must be remembered that he is hearing then at the expense of a greater effort than the normal child must expend to get the same material. While the other pupils are able to catch all of the details with ease, the child with reduced acuity must mobilize his total effort to grasp only a part of what is said. He cannot, therefore, be expected to maintain this forced attention for long periods. The teacher should help him by insisting upon careful attention at critical periods during the day's routine and by being tolerant of some inattention at other times.

Personality.—A child with a hearing loss reacts personally to his handicap. The expected tendency is for him to withdraw to the periphery of his environment. Being continually in a situation where he hears only parts of what goes on about him, he is forever having to rely upon his intuition and his ingenuity to piece the fragments he gets into approximations of what actually is being discussed. Consequently, he is always in the insecure position of never being really sure of himself. Withdrawal is a comfortable and logical solution to this problem. The development of such a passive attitude interferes with his social and educational development, but it also has a deeper importance in that it sets a pattern for a restrained, unhappy childhood. It is the problem of the teacher to prevent such withdrawal in cases where the child's hearing loss is discovered early, or to overcome this tendency if this in-going personality has already developed.

Front-seat placement in itself is helpful because it draws the child to the center of classroom activity. The increased personal stimulation resulting from the physical nearness of the teacher is probably as important an item as any other benefits he may get from being in a favorable position to see and hear what goes on. Likewise any individual instruction he may get or any special consideration he may receive in the classroom will probably have a dual effect—one in the immediate learning, and the other in the encouragement and quickening that comes from kindly adult attention.

The hard-of-hearing child should be brought into as many school activities as possible, both in and out of the classroom. Assignments of errands or other routine duties can have a beneficial result. With older children occasional frank, but sympathetic discussions of this whole problem can offset a tendency to develop an emotional attitude toward the handicap. Such discussions can be equally helpful in calling to the teacher's attention little things by which she can offer further assistance.

Speech.—A hearing loss, ordinarily, has some effect upon a child's speech. If only one ear is involved the speech does not suffer, but when there is a significant loss in both ears some change is to be expected.

The extent to which the speech is affected and the nature of the speech defect is entirely an individual matter, depending upon the degree of the hearing loss, the period over which the loss has existed, the specific characteristics of the loss (whether only high tones, only low tones, or all tones are involved), and finally, the unique qualities of the particular child. For some reason certain persons maintain almost normal speaking habits even after years of practically complete deafness.

The hard-of-hearing child may begin to omit, or roughly, approximate sounds which he does not hear. In offsetting this tendency the teacher can work to make the pupil conscious of pronouncing words carefully and completely. Suggestions for teaching the child sounds which he habitually omits or produces incorrectly are presented in a division on speech training on page 96. Teaching speech to a child with reduced hearing is a difficult problem, but by no means a hopeless one. Helping a child to maintain fairly normal speech before a defect becomes established is a more productive effort.

Participation in singing and choral speaking is helpful in encouraging good vocal quality. Several brief periods each week during which the child is instructed to read aloud slowly, pronouncing all of the consonants carefully, can be useful in keeping alive his memory of the production of sounds which he no longer hears completely. Calling his attention to faulty or omitted sounds and helping him to associate the feeling of making them with the printed letters and words will encourage continued clarity of speech.

Language.—A defect in hearing affects language more than any other function. In this statement language is used in its broadest sense to include all phases of comprehension and expression, both written and oral.

The child with a hearing handicap ordinarily has special difficulty with reading, probably due to the fact that his vocabulary is limited and because oral activity is so important in the initial steps in reading. This is particularly unfortunate as individuals who do not hear well must get most of their exact information through reading. Probably no service that the classroom teacher can render will be more important than help with reading. These pupils should be especially encouraged to use reading as recreation. Individual teaching during the day or private tutoring can be a vital factor in preventing educational and social maladjustment.

Language skills are basic to speech, reading, lip reading, the efficient use of residual (remaining) hearing, and even the successful use of a hearing aid. Directing a child's interests toward the acquisition of vocabulary or proficiency in reading, grammar and original writing can help to offset some of the most detrimental results of reduced hearing. The use of such devices as parsing and diagraming which demonstrate relationships between words and groups of words is especially recommended.

Colds.—Hearing acuity does not always remain at the same level during the entire school year. It is not unusual to discover a child who ordinarily has only a slight loss, temporarily having a moderate or even

a severe loss following a cold or an ear infection. In other words, a child whose hearing test indicates so slight an impairment that he should be able to make normal progress in the classroom may have periods during the year when he should be taught as a deafened pupil. It is important for the teacher to establish an intimacy between himself and the child so that he will inform him when he is having more than the usual difficulty. He will then be able to adjust his efforts to meet the pupil's varying needs.

Background Noise.—The sound level coming from the ordinary school activity in the classroom offers no particular difficulty for the child whose hearing is impaired in both ears. As a matter of fact, background noise may even have some advantage in that it causes the teacher and the other pupils to raise their voices, so that increased speech energy reaches the ears of the handicapped child.

However, in the case of the pupil who has one normal ear and one defective ear the situation is different. Good hearing in one ear is as useful as good hearing in two ears when there is little or no background noise. In the presence of noise the loss in the one ear is a handicap. Reducing the sound level to a minimum while giving assignments or making important explanations is helpful to the child who has a loss in one ear.

Attitudes of Classmates.—The adjustment of the hard-of-hearing pupil is improved if his classmates learn something about his problem. Explaining a few of the simpler considerations mentioned above, such as the importance of standing in front of him when speaking to him and the advantage of approaching him in order that he may share stories and experiences is important.

In the higher grades, especially on the secondary level; it is possible to have certain classmates take responsibilities for sharing class notes with a hard-of-hearing pupil, thus enabling him to pay full attention to the teacher instead of having to glance down at his writing. Reliable pupils can also assume responsibility for some individual instruction.

Pronunciation.—One of the most difficult things for the hard-of-hearing person to master is the correct pronunciation of new words, since he is definitely handicapped in the oral attack on new vocabulary. He will often remember the correct production of words which he had in his vocabulary before his hearing impairment developed or became serious, but his approximations of words which he has not heard are frequently unrecognizable. Developing skill in using the pronunciation key of a standard dictionary is one of the most effective ways of meeting this problem. Practice in applying the key to new words is one more way of keeping the pupil sound conscious and speech conscious.

Time Required.—A teacher can accomplish a great deal with a hard-of-hearing child without overburdening himself. All of the above items will not apply to every child, so a first step is to decide which suggestions will be appropriate for a particular pupil. Next, he can decide which procedures can be incorporated into the classroom routine and

which ones will require individual time. Then, if he will determine how much time he can devote to the child each day he can select one or two of the latter items on which to start to work. One teacher cannot give a child all he needs in one year, but a little time spent each day over a period of years will have a respectable cumulative result. For such items as lip reading and speech training, two or three minutes of daily practice can bring very satisfying adjustments if the drill is followed consistently.

Parents.—Even when a school makes a most conscientious effort to educate a child in spite of a handicap, parents may be critical of the progress made. Occasionally parents refuse to recognize a youngster's problem. Probably the criticism more often results from over-concern for the child's future than from a real dissatisfaction.

In such a case it is often useful to ask one of the parents to cooperate in the special training, taking care to assign a program which will require a considerable effort. Constructive participation in the training frequently relieves any anxiety, and it helps the family to realize many of the problems involved. If the parents fail to cooperate they must share any responsibility for slow progress.

General Discussion.—The attempt to meet the needs of the hard-of-hearing child in the regular classroom often brings so much attention to the exceptional nature of his problem that a teacher may forget that after all there can be more similarity than difference between the educational needs of the normal child and the one with a handicap. In trying to furnish extraordinary helps as hearing aids, lip reading or speech correction the necessity of investigating such a thing as a reading level or gearing instruction to a particular mental capacity may be overlooked. In other words, the hearing loss and the absence of special facilities may lead to an acceptance of a pupil's retardation as an unavoidable circumstance, whereas an honest evaluation might be that the child is handicapped more by poor teaching than by a hearing loss.

Every hard-of-hearing child who is not making a satisfactory school adjustment should be referred for psychological study. Such service is available to districts which operate under the administration of a County Superintendent of Schools through the County Supervisor of Special Education. If the district does not employ a psychologist it may obtain these services by applying to the approved psychological clinics which are listed in the Appendix.

The determination of how successful the pupil with a hearing loss has been in the schoolroom should be based upon the results of objective tests. This is especially urgent when there is some doubt either about his ability or his progress. Such objective tests should include measures of mental capacity and academic achievement in the different subject areas. Poor scores on group intelligence tests cannot be taken too seriously with children who have handicapping hearing losses since their limited language development and their poor reading ability, which limit them in these tests, may have no relationship to mental capacity in their cases.

The final decision on the wisdom of keeping a child in a regular class must be based upon whether or not he is learning in that situation. Progress in this case cannot be measured by comparing the hard-of-hearing child with normal youngsters. Every effort should be exerted to enable the handicapped child to achieve to the limits of his own expertly ascertained capacity, and not a "class average."

B. ADJUSTMENT WITHIN THE REGULAR CLASSROOM WITH ADDITIONAL HELP FROM AN ITINERANT TEACHER

The school adjustments of all hard-of-hearing children can be improved by offering additional individual teaching, whether it is done by a regular classroom teacher, a special reading teacher, a lip reading instructor, a speech correctionist, or a person who has special certification for teaching special classes for the deaf and hard-of-hearing. If a district employs a person with the view to having him spend all or part of his time working with pupils having hearing handicaps a teacher with one of the last three preparations given above will be most effective. Such a special instructor who travels from building to building, meeting the hard-of-hearing children, is referred to as an itinerant or visiting teacher. Large districts may have several such persons on their staffs. Following is a discussion of certain aspects of an itinerant teacher's program.

The Teacher

The type of teacher employed varies considerably. Some districts hire lip reading instructors who are not certificated for public school teaching, but who have had training in private schools. These individuals undoubtedly render useful services, but the children with whom they work have many additional needs which such teachers are not prepared to meet. Because of their limited training their salaries are not reimbursable in part by the State.

Salaries of persons holding special teaching certificates* in speech correction or the education of the deaf and hard-of-hearing are partially reimbursable by the State. A practical combination, especially in small districts, is to have a teacher of speech correction also work with children who have hearing losses. This arrangement is a good one since the correctionist's background in general language is basic to understanding hearing problems. He should, however, include in his preparation some training in hearing if he is to have definite responsibilities in this area. The teacher holding special certification for the education of the deaf can be used either as an itinerant teacher, a teacher in a hearing center, or an instructor in a special class for the deaf.

A person having a hearing loss should be employed only under very exceptional circumstances. Such a person is especially handicapped in giving speech correction, auricular training, and in helping with hearing aids. A handicapped teacher can function relatively more effec-

*The requirements for such certificates are included on page 122 in the Appendix.

tively when his duties are confined to instruction in lip reading, but even there the impaired hearing puts a definite limitation on his services.

Pupil Load

The case load which the itinerant teacher can be expected to handle efficiently may run as high as 200 or 250 children. The assumption is that some of these cases will have little enough difficulty so that they can be almost entirely taken care of by the classroom teacher with some supervision from the itinerant teacher. Others of this number will require little individual help either because their handicaps are slight or because after they have had a considerable amount of attention the special teacher feels that they need only periodic checking. Teachers have been known to handle much larger numbers of children, but it is of doubtful value to spread services so thinly that they lose their effectiveness. Two hundred fifty is a maximum load for efficient work, and even that number is high when there is a larger than usual proportion having serious losses, since they require more attention.

Organization of the Teacher's Time

The time required for each pupil depends, among other things, upon the degree of the impairment and length of the period during which he has received special instruction. It is believed, that after two years of training a person reaches a peak in lip reading ability. From that point on he can improve the serviceability of his lip reading by increasing his vocabulary, but the skill as such remains the same. No hearing case should be removed from the active roll of a teacher as long as he is in school unless his hearing acuity improves to a point where individual help is no longer necessary. Most of the children will require less attention as they grow older.

Group Instruction

Group instruction for speech and lip reading cases is meeting with some disapproval, largely for two reasons: first, organizing children who need help into small classes sometimes leads a teacher to attempt to accept too heavy a case load; second, using group methods entirely does not permit a teacher to deal with individual problems. While it is important to consider the unique aspects of all hearing cases it is also true that the children have many needs in common which can often be met more effectively in groups than in private interviews. This is especially true of much of the work in lip reading, auricular training, language training, and certain aspects of speech correction. Group instruction, carried out only in conjunction with individual work can be justified as an effective teaching plan as well as an efficient use of a teacher's time.

Classes should never contain more than eight or ten pupils except in cases where the children are older or when they already have had a considerable amount of training. With children of the early elementary grades the number should not exceed six. Classes for older pupils ought to last at least from thirty to forty minutes. It is very difficult to hold

groups of younger children who are just beginning lip reading for more than twenty minutes. Attending two such classes each week will bring better results than being in one class lasting twice as long, and ordinarily, two periods should be arranged for a child each week. One lesson per week is often adequate in cases where pupils have already gained considerable skill.

Individual Work

Individual work is done with pupils whose needs cannot be met in a group. General counseling, help with a hearing aid, certain types of articulation training, and individual teaching in language, for example, often constitute situations in which a teacher cannot handle more than one pupil at a time. Individual training is also necessary with pupils who cannot be grouped satisfactorily because of age, ability, achievement or degree of hearing loss. Generally, it is best to use group work whenever possible, but at the same time the teacher who finds too few pupils needing individual attention is possibly not familiar enough with their problems. Cases of children requiring more than two hours of individual help each week over an extended period of time should be investigated carefully to see whether it is advisable to place them in a special room or school for the deaf.

Cooperation of the Classroom Teacher

The chief purpose for obtaining special instruction is defeated if, as a result, the classroom teacher feels that she no longer has a responsibility for the child with a hearing loss. The function of the special teacher is best conceived of as an attempt to augment the help which the regular teacher can give, by offering such aids as lip reading, direction for the use of a hearing aid, speech correction, etc., for which the average teacher is not trained. Employing a special teacher should enable certain pupils who would otherwise be sent to special schools or classes to remain in their regular grades and to improve noticeably the work of the much larger group which would have much more difficulty without this additional help. The core of the responsibility, the actual teaching of the hard-of-hearing child, must remain the responsibility of the classroom teacher.

A teacher having a handicapped pupil in daily attendance has an opportunity to do more for him than the itinerant teacher can in his weekly or bi-weekly visits. The special teacher who works through the classroom teacher can reach more children and greatly increase his general effectiveness in meeting hearing problems by making suggestions for adjustments in instructional programs, general classroom management, and even directing teachers in furnishing practice opportunities for lip reading and speech correction. The itinerant teacher should also confer frequently with administrative officers in order to facilitate adjustments for the handicapped pupils. Such contacts with the instructional and administrative staff places a premium on maturity and experience in the itinerant teacher. This manner of meeting the needs of the acoustically handicapped child is definitely to be encouraged.

C. ADJUSTMENT WITHIN THE CLASSROOM WITH PART-TIME ATTENDANCE IN A HEARING CENTER

A hearing center is a centrally located room to which pupils with impaired hearing report for special instruction, as contrasted with the setup of the itinerant teacher who travels about to reach the handicapped children in their own rooms. Such a center is ideally found in a school building containing all grades from the first through the twelfth, so that the children can report for scheduled periods of training and return to their classrooms for their regular instruction. Where no one building houses all of the grades a center may be placed in a grade school, preferably one adjacent to a high school, so that pupils on the secondary level can at least attend late afternoon or morning classes. The assumption is that unless the district is large enough to warrant the establishment of several centers, children with hearing impairments who otherwise attend classes in different buildings can be enrolled in the school having the center.

While choosing between having an itinerant teacher and a hearing center must often depend upon the locations of schools and transportation facilities, the center has certain advantages in its centralization of the problem. Equipment and materials not readily transportable can be used. The extensive use of one room justifies reserving a more favorably situated and arranged space than can be given to the itinerant teacher who usually must accept whatever cubicle happens to be available, no matter what its bad features may be. Concentrating the hearing problems in one building can also, through a coordination of the special teacher's efforts, gradually train a corps of classroom teachers to cooperate effectively with the work of the center. At least theoretically, the teacher in the center is not necessarily better trained than the itinerant teacher. Nevertheless, the work in a center puts a premium on superior training and superior personnel. These points are elaborated below.

Equipment

The most important single item of equipment in a hearing center is a group hearing aid, which should be complete with approximately a dozen earphones with individual volume controls. Individual desk aids or wearable models may be substituted for the group aids. Amplification is used in the auricular training and speech training. Other suggestions include a record player which can be attached to the group aid and an assortment of records for rhythm and ear training.*

The Room

A room situated on the top floor and located so as to be away from street traffic and sounds which originate from shops, playgrounds, music rooms, gyms and other noisy units in a building is desirable. Porous plaster which absorbs sound has an advantage, but if the walls do not

*A list of suggested recordings is given on page 121 in the Appendix.

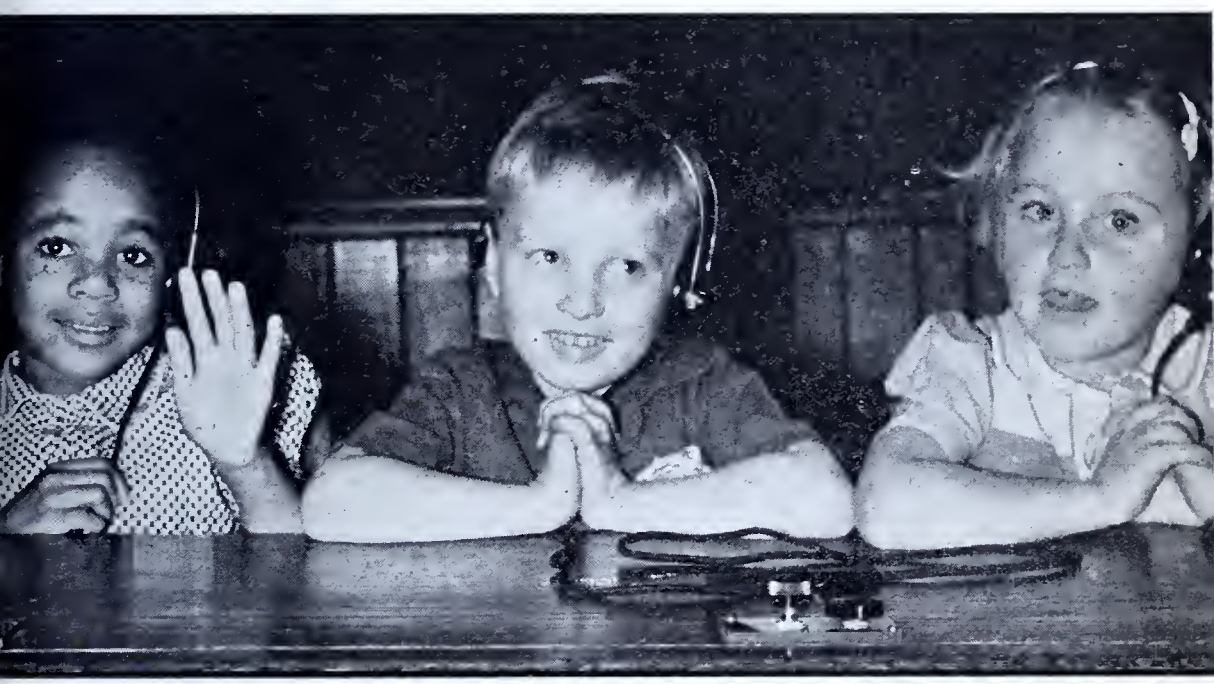


Figure 9. Hearing Speech With a Group Hearing Aid

have sound-absorbing surfaces, strips of perforated wallboard to cover the portions of walls and ceiling adjacent to all corners should be applied so that roughly a third of the total wall space is treated. Wallboard should not be painted since painting insulating board destroys its sound absorbing values. Cork or linoleum floors are preferable to hard floor surfaces. This treatment is intended to cut down reverberation more than to reduce the penetration of sound into the room. If the whole wall surface is covered, rather than only a portion as suggested above, voices will be "deadened" so as to give them a dull, artificial quality.

The doors, including any windows or vents in them, should be covered on each side with a thick layer of fibreboard. Crevices around the door, including the bottom, should be sealed with felt weatherstripping. This precaution is taken to cut down the penetration of hall or building noises. Needless to say, when such measures are taken to exclude sound and to reduce reverberation which might interfere with the hearing aids, it is important to keep doors and windows closed while this equipment is being used.

The above-listed measures are designed to create a quiet environment which is different from the usual situation in which a hearing aid is used. For teaching purposes such an environment is desirable in that it makes it possible to use stronger amplification of speech, thus giving the wearer a clearer impression of speech than he can get otherwise.

Proper lighting is equally as important as the sound treatment, since inadequate light interferes with the use of lip reading. Both natural and

artificial light should be controlled so there are no concealing shadows on the teacher's face. Indirect lighting and light colored walls are helpful.

Otherwise, the room should be large enough for the teacher's desk and a semi-circle of twelve desks no farther than ten feet from the teacher. Ample blackboard space adjacent to the favorable teaching area and cupboards or shelves for storing materials should be included.

The Cooperation of Classroom Teachers

Just as is true in the case of the itinerant teacher, the classroom teacher cannot shift the full responsibility for educating the hard-of-hearing child over to the special teacher. The pupil comes to the special room for certain training, but the regular teacher still has the major task of helping him to acquire essential skills and subject matter.

With the hard-of-hearing pupils concentrated in one building, the number of teacher contacts necessary to facilitate the classroom adjustments of the handicapped children is reduced. The special teacher should be permitted to take advantage of this situation to initiate a consistent program of teacher-education to help the classroom teacher to make reasonable changes in her procedures. Having the regular teachers visit the center is helpful. Such contacts should, over a period of years, lead to an intelligent understanding of the problem by all of the instructional staff in the building.

The Special Teacher

The teacher in the hearing center has more opportunity to make a broader approach to hearing problems than the itinerant teacher. Having a group hearing aid enables her to go further into acoustic training and speech development than the teacher who travels from building to building can go. The opportunity for more intimate as well as more frequent teacher contacts enables the instructor in a hearing center to actually supervise the use of such things as reading materials which are especially adapted for hard-of-hearing children in the classroom. In other words, the position puts a premium on a background in the total education of children with hearing handicaps rather than on training in only a few of the special aids for them. Such a teacher should have the special State certification for teaching special classes for the deaf and hard-of-hearing.

Generally, all of the statements made concerning the itinerant teacher, including those relative to case load and class size, apply to the teacher in a hearing center. Both work with essentially the same group of children and many of the things they do with them are identical; the primary difference is one of organization.

D. ATTENDANCE IN A SPECIAL CLASS FOR THE DEAF

The pupils who would be placed in special classes for the deaf and hard-of-hearing are the ones who would, ordinarily, be sent to residential schools for the deaf if school boards did not provide for their

education in the home districts. The standards for selecting the enrollments of the special classes also apply to the selection of pupils to attend the residential schools. Since through the established residential schools the State and local boards already have made educational provision for this group of children, it is suggested that districts wishing to improve the local educational opportunities for the acoustically handicapped pupils give first consideration to the large group of pupils with impaired hearing whose degree of impairment does not warrant placement in the special schools or classes, but who are, nevertheless, really handicapped in the regular classes where they must compete with youngsters with normal hearing. Provision for this presently-neglected group through adequate testing programs, itinerant teachers and hearing centers should logically precede the establishment of special classes for a group for which facilities are already provided in the residential schools.

The special class for the deaf differs in organization from the program with an itinerant teacher or a hearing center in that the pupils receive all or a greater part of their academic instruction from the special teacher, rather than reporting to her only for certain helps. When several such classes are centered in one building they are frequently referred to as a "day school for the deaf." In larger cities these day schools are often large enough so they are housed in separate buildings. Confining the instruction of the children who have severe hearing handicaps to one school has many possible advantages in respect tc equipment, special construction, specialized administration and homogeneous grouping of pupils. However, there is the disadvantage of limiting the association with normal children.

Location of the Room

Wherever possible the special rooms for the deaf and hard-of-hearing should be situated in a centrally located grade school, preferably one having all the grades up through the junior high. Being near a high school offers an advantage in that it makes it possible for older pupils with impaired hearing to take parts of their work with normal pupils of their own age. The same suggestions regarding the selection of a part of a building which will be away from traffic and building noises, that were listed in connection with the hearing centers, apply to the room for the special class. However, if such precautions will lead to occupying a room in an administration building where no other classes are held, or if it will place the pupils with hearing handicaps in a completely isolated corner of a school building, it will be better to decide upon a noisier location which is closer to school activities and to take other steps to reduce the sound level.

The Room

The statements on page 58 pertaining to a satisfactory room for the hearing center all apply to the room for the special class with the exception of the reference to the size. The room for the special class

must be larger since it will have to accommodate the whole day's activities of a larger number of pupils. There is an advantage in having sufficient floor space so that there can be two areas of activity in the room. One area will be centered about the teacher's desk and the group hearing aid where most of the oral instruction will take place. The other activity area will contain the permanent seats of the pupils. A room the size of an ordinary classroom should be adequate.

Equipment

Probably the most important single item in the equipment is again a high fidelity group hearing aid. A special class which does not have such sound amplification apparatus is not in a position to give efficiently the type of special instruction for which it was organized. Individual hearing aids may be substituted for the group equipment.

Almost all of the instruction is given through the hearing aid, so it is advisable to set it up in the most favorable teaching position as far as lighting, blackboard arrangement, etc., are concerned. Furniture is arranged around this main teaching area. Eight to ten adjustable desks

Figure 10. Using the Group Hearing Aid in the Special Class

should be set in a semi-circle about the teacher's position, the radius of the semi-circle being approximately ten feet. Each desk should be equipped with a jack into which an earphone can be plugged. A separate volume control should be provided for each earphone. There is an advantage in attaching the volume controls permanently to the desks since allowing them to hang free on electrical cords increases the possibility of breakage. Another precaution to prevent damage is to have trays or compartments into which the earphones can be placed when they are not being used built on the front surfaces of the desks. A wide range of ages and grades is sometimes represented in one room. Chairs for the smaller children can be arranged in front of the desks, making an earphone available for each chair.

The furniture and the hearing aid ought to remain movable. However, there is an advantage in having certain installations permanent, avoiding the necessity of having loose electrical cords running along the floor. Lines can be run under the floor or along the floor and covered with metal stripping. One line having a jack at each desk should run from the hearing aid to the desks in the semi-circle. A second line from the amplifier to the blackboard should be attached to the wall beneath the chalk trays. Jacks spaced at intervals of three feet in this line make it possible for pupils to use the hearing aid while working at the board or while reading and reciting before the class.

In addition to the chairs and desks grouped around the critical teaching area, each child should have a desk at which he sits while reading or studying. Again, a greater variety of activity is possible if this furniture is movable. These additional desks also can be wired for the hearing aid at little expense, and there is a great advantage in it. However, this is not an absolute necessity.

A variety of musical toys, noise makers or objects making distinctive sounds when they are dropped or tapped are useful for the initial stages of auricular training.* A phonographic record player with an assortment of vocal and instrumental recordings also can be used to good advantage.** With some selection, a wide experience in environmental sound can be given with recordings of sound effects used in radio broadcasting studios. Having a speaker of a radio removed and attaching jacks so that pupils can plug their earphones directly into it or connect the hearing aid so that additional gain in tone is achieved offers further opportunity for aural experience.

Dictionaries and books for supplementary reading are necessary just as they are with normal children. The general emphasis in instructional materials for children with impaired hearing should be on those implemented by visual aids. Every advailable visual representation ought to be utilized. This places special importance on arranging to have the largest possible amount of display space on walls, table tops, shelves, and in cases.

Work books in many subject areas, especially early reading, have shown an increasing emphasis on exercises involving tracing, drawing,

*A suggested list of such noise makers is given on page 120 in the Appendix.
**A suggested list of records is given on page 121 in the Appendix.

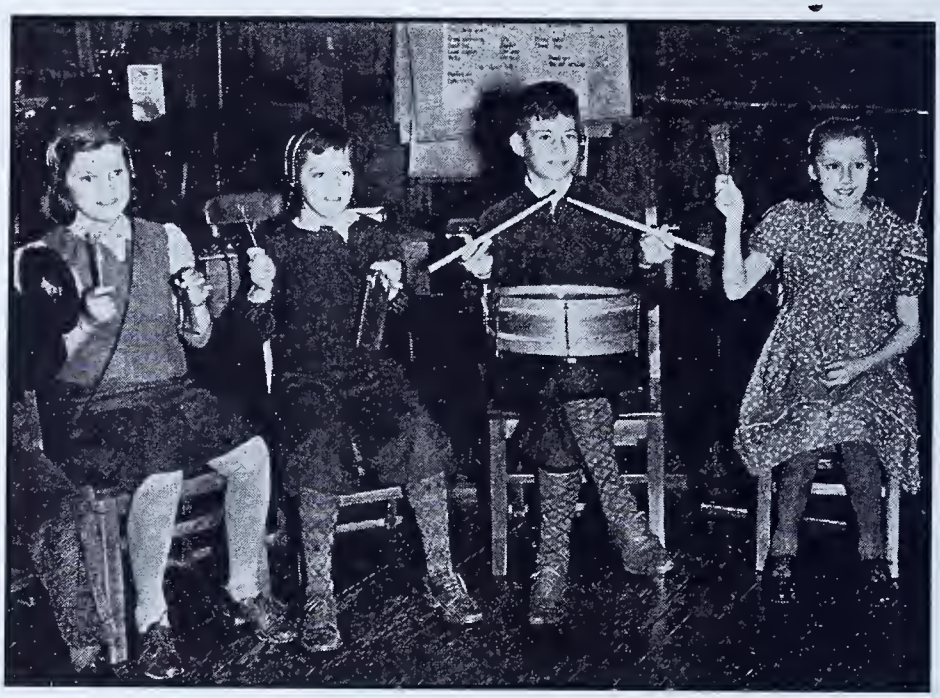


Figure 11. Training the Hearing With Gross Sounds

pasting, etc., which represent visual controls and reinforcements of the learning tasks. These, of course, have special values for the child with a hearing loss. While the selection of such drills in one particular book may be sufficient to teach a certain fact or relationship to a normal child, it must be remembered that while he is working he is constantly drawing upon language experience which he has gained through hearing. At the same time his learning is aided by the constant stream of oral instruction from the teacher. An identical assortment of drills might not be at all adequate to teach the same thing to a deafened child. The special teacher should be aware of this fact and supply himself with the widest possible variety of work books and hectographed materials.

Selection of Pupils

It is to be expected that most of the pupils enrolled in a special class for the deaf will have more serious impairments than those who remain in the regular grades with or without the help of a special teacher. However, the severity of the losses cannot be the only criterion for placing a child in a special class. Such placement should be made in consideration of all of the following items:

1. *Test of Acuity.*—A child who has usable residual hearing should never be admitted to a special class for the deaf except on the basis of a test with a discrete frequency audiometer which has A.M.A. approval. Results obtained with the use of multiple or phonographic audiometers, forks and the whispered voice are not

acceptable as substitutes. In cases where a child has no usable hearing it is safe to arrange special class placement if the other factors listed below are considered. Those assigned to the special class should have a discrete frequency audiometer test each year.

2. *Degree of Impairment.*—The critical point in considering the degree of impairment is the smallest amount of loss a child may have and still be properly placed in a special class. Probably no child whose loss for tones 128 and 256 on the discrete frequency audiometer is less than 25 decibles should be accepted in a special class for the deaf. A loss of less than 25 decibels on any three tones should disqualify him. One whose average loss for the speech range (256 through 4096 cycles) is less than 25 decibels ought to be able to adjust in the regular class.

3. *Medical Examination.*—Permanently removing a child from his normal educational environment cannot be justified unless a medical opinion, preferably from an ear, throat and nose specialist or an otologist, indicates that the hearing cannot be improved to a point where continuance in the regular schoolroom will be possible. If it appears that improvement cannot be brought about in the near future the child may be satisfactorily placed educationally if he is admitted to the special class on a temporary basis and removed as soon as the improved hearing warrants the transfer. When medical attention is not available for a child he will be better off in the special class than if he sits in his regular room waiting for such attention.

4. *Age of Onset.*—The age at which a child develops a handicapping hearing loss is an important factor. A pupil who had efficient hearing while learning to speak may get along in the regular class while another child with the same loss or a smaller one, who did not learn oral language properly because he encountered his impairment earlier in life, may have to attend the special class. Likewise, a person who began to read before his loss developed has an educational advantage over one whose loss was present before starting to read. Generally, the older a child is when the hearing impairment comes on, the easier it is to educate him.

5. *School Conditions.*—It is not uncommon to find a classroom teacher, who is capable of meeting individual problems, succeeding in teaching a child who is severely handicapped by a hearing loss. Although having a pupil fail to make a proper adjustment is no reflection on a teacher, nevertheless a borderline case frequently can continue his education with normal youngsters because of an especially favorable situation in his regular class.

6. *Home Conditions.*—A borderline case may also be successful in making his way in the normal school situation because he is fortunate enough to have understanding and assistance in his home. Many of the time-consuming things which the teacher can do to help the handicapped child in school do not require more back-

ground than the average parent can pick up. Favorable home surroundings may enable certain pupils to avoid special class placement.

7. *Intelligence.*—The degree of handicap resulting from any defect depends upon the ability the person has to get along in spite of it. Impaired hearing does not make it impossible to learn, but it does make it more difficult to learn. The youngster with better than average mental capacity can frequently progress normally in school while a slower child with the same degree of loss has to attend a special class.

Objective measurement of the mental capacity of every candidate for a class for the deaf is a necessary step before placement is arranged. Intelligence tests should be administered only by properly certificated psychologists. Results of tests of mental capacity which put a premium on language development, such as the Stanford Binet, should be used with extreme caution, and in every case additional data obtained from performance tests must be considered.

It is frequently difficult to determine how much of the poor performance of a young, acoustically handicapped child is due to the impaired hearing and how much is to be explained by slow mental development or lack of opportunity for development. The youngster who is uneducable* should not be admitted to special classes for the deaf any more than he should be admitted to any other division of the public school organization. The educability of a child should be determined by a properly certificated psychologist. His decision must be based upon scores earned on standardized tests which have validity for deaf subjects in addition to a careful consideration of all qualifying conditions, including social maturity, play life, and the opportunity for development in the home. In a doubtful case the child should be given a trial in the special class.

A six-year-old child with normal hearing whose mental development is slow, but who is educable, is frequently kept at home for another year, with the idea that he will have a better chance to make a successful start with his education after a twelve-month interval. Such a procedure should be followed less frequently with a hard-of-hearing child, who is not so apt to achieve a readiness for education in the home, than with the normal child. The special teacher can accomplish much in the way of developing basic language concepts and in initiating speech with such a youngster, even

*"On recommendation by any supervising principal or teacher, a superintendent or a supervising principal may on approval or authorization by his board of school directors, suspend from entering or continuing in the first grade or public school any child who has been found, on an appropriate individual mental test or examination properly administered in a mental clinic that is approved by the State Council of Education or by a person who is certificated by the Department of Public Instruction as a psychological examiner or as a public school psychologist, to have a mental age of less than four and one-half years. After due lapse of time, as determined by the intelligence quotient of the child, or on the basis of results obtained on an appropriate reexamination not before the first of September of the school year next following the school year in which the suspension was made, a child may be reconsidered for admittance into the first grade, for further suspension, or for permanent exclusion on grounds of mental incapacity."—*Ruling by the State Council of Education.*

though his mental age is quite a bit lower than what it should be to begin reading.

8. *Additional Defects.*—A pupil having more than one defect is much more apt to fail to make normal school progress than one having a single defect. A candidate for admission to a class for the deaf should be studied carefully to detect additional problems. Where other problems present themselves care must be taken to be certain that special adjustments to compensate for the hearing loss can really meet the pupil's greatest educational needs. Educationally he can be as badly placed in the special class for the deaf as he can in the regular room.

9. *Achievement.*—A pupil who is under consideration for transferral from a regular grade to the special class should be given standard achievement tests to get objective measures of his success in the different subject areas. Interpreting the results of such tests in terms of the mental age and the school history furnishes a basis for evaluating his adjustment in the ordinary class situation.

10. *Availability of Other Helps.*—Discovering that a child who has a hearing loss is not making normal progress in school is not necessarily final in considering special class placement. Fitting a hearing aid, arranging for special tutoring in different subjects, or attending a summer clinic might bolster him enough to warrant his remaining in his regular room. Persistent attendance in summer clinics where speech correction, lip reading and remedial instruction in academic subjects are available will sometimes enable a pupil who must otherwise attend a special class to succeed with his regular classmates.

In all cases, enrollment in a special class is to be decided after considering the whole child in terms of the complete home and school environment, rather than on the basis of hearing acuity alone.

The Pupil Load

The class size must depend somewhat upon the range in ages and abilities. In a community where one or two classes take care of all of the deafened youngsters from the first grade through the twelfth, there is often little opportunity for homogenous grouping, and in order to do creditable work the enrollment should be smaller than the usual one. Where there are several special classes for the deaf in one district there is considerable opportunity for grouping children for instruction. Under these circumstances a teacher can handle a class of ten youngsters. Fewer than six pupils can hardly justify the employment of a full-time teacher. However, in a case where a special class enrollment is less than six, the retention of a teacher on a full-time basis is practical if he devotes a portion of his time to helping pupils whose hearing losses are not great enough to warrant special class placement. In this setup the room may be used both as a special classroom and as a hearing center.

Individualized Instruction

A group of hard-of-hearing children is apt to have just as wide a variation in abilities and problems as an equal number of normal children and it is just as important that their instructional programs allow for these differences as it is with pupils in regular public school classes. In the instruction of any child there is a big difference between "individual instruction" and "individualized instruction." By individual instruction the pupil is getting personal teaching, but such instruction is not individualized unless it is geared to that particular child's capacity, ability and needs. There is a danger in that special teachers may feel that because they are using a particular approach with a group of children who have one defect in common that they are offering them an adequate education, whereas with the exception of recognizing one problem the program may be rigidly regimented. The teaching in the special class for the deaf should be both individual and individualized.

Social Development

One of the possible advantages placement in a special class may have over enrollment in a residential school is that the special class can offer more possibility for association with people who have normal hearing. To make the most of this advantage is a challenge to the teacher.

As a general rule, the deafened children ought to join normal pupils of their own age in every activity in which they can participate with any degree of adequacy. Younger children from the special class can join children of early elementary grades for play periods, rhythm bands, crafts, art, music and recesses. Those who are a little older should have art, music, gym, assembly and recess with pupils of appropriate rooms. On the secondary level they can attend regular classes in art, homemaking, shop, typing, bookkeeping and music. As the special pupils gain skill in lip reading and learn to use their residual hearing or hearing aids better they should be tried in regular classes. In many cities children from day schools for the deaf attend high school, often following a specially selected course of study and reporting back to the special room for counseling and other help.

Special class pupils profit from participation in all extracurricular activities such as clubs, athletics and music. They can rarely perform well enough for membership in good glee clubs, and very few do well with string instruments. Hearing impairment does not hinder them as much with wind and percussion instruments.

Placing the special classes in buildings where the hard-of-hearing children must use playgrounds, entrances and halls with normal children is important to the social development of the child with reduced hearing. Confining them to out-of-the-way wings or administration buildings may not only give them a feeling that they are different, but it may also encourage the normal children to feel that the hard-of-hearing pupils are very different.

The purpose of setting up a special class is to prepare children with hearing losses to make the best possible adjustments in a hearing world.

They should learn early to recognize that they are different, but that this difference is not one that necessarily disqualifies them, and that normal people do not automatically penalize them because of the handicap. Such a social outlook can be conditioned best by supervised experiences with normal children such as are possible when the special class children are a part of a regular school system.

The Teacher

The teacher for the special class should hold the special State certification for teaching a special class for the deaf and hard-of-hearing.

E. ATTENDANCE IN A RESIDENTIAL SCHOOL FOR THE DEAF

Legal Provision

When the education of children who are handicapped by impaired hearing cannot be provided in the home school district, they can be placed in residential schools for the deaf. Section 1413 of the School Laws of Pennsylvania contains the following provision for blind or deaf children between the ages of six and twenty-one who live in the Commonwealth:

> "When any child between the ages of six (6) and twenty-one (21) years of age resident in this Commonwealth, who is blind or deaf, is enrolled, with the approval of the Department of Public Instruction, as a pupil in any of the schools or institutions for the blind or deaf, under the supervision of or approved by the Department of Public Instruction, the school district in which such child is resident shall pay twenty-five per centum (25%) of the cost of tuition and maintenance of such child in such school or institution, as determined by the Department of Public Instruction; and for the tuition and maintenance of such children, the Commonwealth shall pay, out of funds appropriated to the department for special education, seventy-five per centum (75%) of the cost of their tuition and maintenance, as determined by the department."

The Proviso in Section 1413 affecting deaf or blind children living in the Commonwealth whose home school districts cannot be determined is as follows:

> "Provided, That the Commonwealth shall pay, out of moneys appropriated to the department for special education, the cost of tuition and maintenance of any child between the ages of six (6) and twenty-one (21) years of age, who is blind or deaf and is enrolled, with the approval of the Department of Public Instruction, as a pupil in any of the schools or institutions for the blind or deaf under the supervision of or approved by the Department of Public Instruction, if the residence of such child is in a particular school district in the Commonwealth cannot be determined."

Although the lower limit of the legal school age is prescribed as six years in Section 1401 of the School Laws of Pennsylvania, educators of the deaf are in complete agreement that there is a decided advantage in beginning the instruction of deaf children earlier. The voice quality and the intelligibility of the speech of deafened persons whose training was started before five are invariably superior to those of pupils who were older when they entered school. There appears to be justification for believing that there is an early stage in the development of children which is favorable to the acquisition of oral language and that by postponing the teaching of language and speech extremely valuable years are lost.

Figure 12. Learning a Trade in a Residential School for the Deaf

There is after all, little reason for assuming that the beginning school age of the deafened child and the normal child should be the same, since their learning problems are quite different. The youngster with good hearing comes to school after having had at least four years of experience in handling oral language. In approaching reading he learns to interpret his already developed language pattern in terms of the printed symbols. The young deaf child begins his school career with little or

no previous language experience. He must develop many language concepts before he begins to read. Reaching a mental age of six or six and one-half is thought to be an important part of a normal child's being ready to begin reading. The deafened youngster's first learning experiences involve tasks which can be handled with a lower mental maturity than six and one-half years.

Likewise, there are occasional instances where deafened persons do not enter special schools until they are quite a bit beyond the usual beginning age. They may consequently reach twenty-one, when the local school districts are no longer responsible for their shares of the expense of their education, and not have completed their training. The following portion of Section 1413 of the School Laws of Pennsylvania provides for the education of individuals under six and over twenty-one:

> "When any person less than six (6) or more than twenty-one (21) years of age resident in this Commonwealth, who is blind or deaf, is enrolled with the approval of the Department of Public Instruction, as a pupil in any of the schools or institutions for the blind or deaf, under the supervision of or approved by the Department of Public Instruction, the Commonwealth shall pay to such school or institution, out of moneys appropriated to the Department for special education, the cost of tuition and maintenance of such person, as determined by the Department of Public Instruction."

Location of Schools

Deafened residents of the Commonwealth may be educated at State expense or at the joint expense of the State and the home school district in three residential schools. One of these, the Pennsylvania State Oral School for the Deaf located at Scranton, Pennsylvania, is the only school for the deaf owned by the State. The other two schools are privately owned institutions from which the State purchases services. They are, the Pennsylvania School for the Deaf at Mt. Airy, Philadelphia, and the Western Pennsylvania School for the Deaf at Edgewood, Pittsburgh.

Length of Terms

The residential schools for the deaf have ten-month school years with summer and Easter vacations and holiday recesses. The dates of the school terms coincide roughly with the schedules of the public schools.

As a usual thing, the deaf child completes his training in twelve years just as the normal child does. Pupils who transfer from the public schools are started in the residential schools in accordance with the progress they have made in the home districts. The time required to educate a child is, of course, a highly individual matter, depending, among other things, upon the pupil's health, ability, attendance and application.

Expense to the Family

The complete cost for the tuition and maintenance of a child in a residential school for the deaf is borne by the State and the local school district. The parents or guardians furnish clothing, transportation, spending money and incidentals. In other words, the family or guardians take care of only those items which they would naturally meet if a child were attending school in the home district.

Arranging Admittance

Information regarding arrangements for enrolling in a residential school for the deaf may be obtained by contacting local school administrators, by writing to the Division of Special Education in the Department of Public Instruction at Harrisburg, or by contacting the heads of the special schools directly.

F. ADDITIONAL ITEMS REGARDING THE SCHOOL ADJUSTMENTS OF CHILDREN WITH HEARING IMPAIRMENTS

Joint Classes

When it is impractical for a school district to provide special instruction for children who have impaired hearing, either because of the small size of the district or the limited number of children who need such help, several districts may cooperate in setting up a special class or in employing a special teacher. Various combinations of the teacher's duties are possible. For instance, a speech correction teacher may also serve as an itinerant teacher for the hard-of-hearing. Either a teacher of speech correction or a teacher with certification for teaching a special class for the deaf may do the audiometer testing in addition to acting as an itinerant teacher for the hard-of-hearing, or as a teacher in a hearing center.

Transportation of Exceptional Children

It is possible to provide for a child who is eligible for special education because of hearing impairment, but who cannot be properly educated in his home district, by furnishing transportation to a district which has approved facilities for such special education. Section 1413 of the School Laws of Pennsylvania contains the following provision:

> "Any physically or mentally handicapped child, who is regularly enrolled in a special class that is approved by the Department of Public Instruction, or who is enrolled in a regular class in which approved educational provisions are made for him, may be furnished with free transportation by the school district. The Commonwealth shall reimburse any school district furnishing such transportation, in the same manner and amounts as provided for in this act for the transportation of pupils from closed schools."

By this same provision, a school board may furnish transportation within the district for exceptional children needing such assistance.

This is especially necessary with younger pupils who may meet with accidents because they do not hear traffic sounds or warnings. No minimal distance for which the transportation can be furnished for exceptional children is established.

When transporting a child to special educational facilities is not feasible, a board may elect to maintain a child in a district which is set up to meet his school needs. Section 1413 of the School Laws of Pennsylvania further provides:

> "When it is not feasible to provide such transportation the board of school directors may in lieu thereof, pay for suitable board and lodging for any such child: Provided, That in no case shall the State's share of the cost exceed one dollar ($1.00) per day per pupil for the actual number of days such pupil is in attendance at school, not exceeding five days in any one week."

A district which provides an exceptional child with transportation to another district having approved special class facilities is entitled to State reimbursement. A table giving the rate of such reimbursement effective June 1, 1944, is given below.

True Evaluation Per Teacher	*Rate of Reimbursement*
$25,000 or less	90%
More than $25,000 but less than $50,000	80%
More than $50,000 but less than $75,000	75%
More than $75,000 but less than $100,000	70%
More than $100,000 but less than $150,000	65%
More than $150,000 but less than $200,000	60%
More than $200,000 but less than $250,000	55%
More than $250,000	50%

There are certain maxima set for the different classes of school districts and also definite requirements as to the contracting for such transportation. Complete information regarding these matters can be obtained from the Bureau of Administration and Finance, of the Department of Public Instruction.

When a special class child is sent to an approved special class in another district, the district sending the child is obligated to pay to the district receiving him tuition which has been computed in the manner prescribed by the School Laws of Pennsylvania. It should be pointed out that the rate of this tuition is determined in light of the general program at the elementary or secondary level, as the case may be, rather than in terms of the tuition cost in the special class. The reason for this is that, while the special class per capita tuition cost is higher than that of the regular program, the district receiving the special class child is being given an additional reimbursement by the State to help care for this difference.

Reimbursement for Special Classes or Schools

Section 1413 of the School Laws of Pennsylvania contains the following provision:

> "School districts maintaining special classes in the public schools or special public schools or providing special education, as hereinafter specified in this section, shall receive reimbursement, as provided by law, so long as such classes, such schools, and such special education are approved by the State Council of Education as to location, constitution and size of classes, conditions of admission and discharge of pupils, equipment, courses of study, methods of instruction, and qualifications of teachers."

The State appropriation for special classes is greater than it is for the regular classes for normal children. Section 1210, 19, (b) contains the following provision:

> "For each full-time teacher of a special class, and for each full-time supervisor or principal of special schools or classes organized by any school district and approved under legislation providing for the special education of physically or mentally handicapped pupils, there shall be paid to the district, in addition to other payments herein provided, sums as follows: To districts of the first class, twenty-five per centum (25%), and to other districts, thirty per centum (30%) of the minimum salary, respectively, prescribed herein for elementary teachers in such respective districts; and for each part-time teacher, supervisor, or principal employed in approved special education, a fraction of such amounts proportional to the time for which such person is employed:
>
> (And provided further) PROVIDED, That the total amount paid to any school district on account of any such teacher, supervisor or principal employed in special education shall not exceed eighty per centum (80%) of the salary actually paid to such person."

Approval of Special Classes

In the sections of the School Laws of Pennsylvania, covering the education of exceptional children, frequent mention is made of the fact that State reimbursement for the support of special classes as well as for transportation, tuition or maintenance for exceptional children who are educated in school districts other than the home districts, is contingent upon approval of such special education facilities by the State Council of Education and the Department of Public Instruction. Standards for the organization and administration of special classes were approved by the State Council of Education at a regular meeting on October 1, 1926. The standards pertaining to the deaf and hard-of-hearing are as follows:

> *Location.*—"Buildings or classrooms in buildings used for classes for the deaf shall comply with the requirements of Article VI of the School Code."

Constitution.—"Classes for the deaf shall include the totally deaf and the exceedingly hard-of-hearing."

Size of Classes.—"The maximum enrollment for classes for the deaf shall be ten pupils."

Conditions of Admission and Discharge of Pupils.—"Pupils are admitted and discharged from classes for the deaf on the recommendation of the medical inspector or an otologist."

Equipment.—"The equipment of these classes shall be similar to that found in approved residential schools for the deaf for academic training, and training in manual and household arts."

Courses of Study and Methods of Instruction.—"Courses of study and methods of instruction in the types of special classes . . . shall be subject to the inspection and supervision of the Department of Public Instruction and approved by it."

Teacher Certification.—"Standards for certification of teachers . . . were previously approved by the State Council of Education. These requirements are on record in the Teacher Education and Certification Division of the Department of Public Instruction. Legal certificates for each type of special class is therefore required."

The information contained in Part II is written in terms of the above standards. A district wishing to organize educational provision for deaf and hard-of-hearing children should consult with the Chief of the Division of Special Education.

PART III

SOME SEPARATE ASPECTS OF FOLLOW-UP WORK

A. THE MEDICAL ASPECT OF THE HEARING PROGRAM

(The following is taken from a paper "Audiometry in the Diagnosis and Treatment of Deafness in Children" by Walter Hughson, M.D., and Eva Thompson, A.B., read before the Forty-ninth Annual Meeting of the Triological Society, Inc., New York, New York, June 9, 10, 1944. From the Otological Research Laboratory, Abington, Pennsylvania.)

"THE ENTIRE program of national, State and local child-hearing surveys has been directed towards the early detection of hearing losses in children and the subsequent prevention and amelioration of this disability. National and State organizations have appointed committees whose purpose is to discover the number of children with impaired hearing in the public schools, and where possible, to institute corrective measures for all those with a demonstrated hearing loss. Thousands of children have had their hearing tested in different cities throughout the country. As a result of these surveys, it can be reasonably assumed that 3 per cent of the children in public schools have a handicapping hearing loss.

"The American Academy of Ophthalmology and Otolaryngology has sponsored, through one of its special committees, that assigned for the Prevention and Conservation of Hearing, a program whereby an early diagnosis of a hearing impairment can be made and appropriate measures to correct the hearing loss or prevent further impairment can be instituted. This is the crux of the situation and should be considered the basis of all child-hearing studies.

"The establishment of a hearing loss by audiometric examinations is only one phase of the general diagnostic procedure in children with impaired hearing. History and physical examination plus the demonstrated hearing loss are the critical triad. Together they are conclusive, individually they are unconvincing. It is assumed that all such children have been given careful and adequate ear, nose and throat examination and that pertinent facts in the clinical history are a matter of record. Prevention and alleviation of deafness in children is the aim of every otologist and of all groups interested in this important problem. Progress in our knowledge of hearing impairments in children is dependent upon audiometry. No otologic condition in a child should be exposed to treatment until careful appraisal of the actual hearing level has been made.

"The diagnosis of hearing impairment or deafness in children can only be of significance if it points the way towards rational therapy. By the same token the only justification of therapy can be the measured demonstration of improvement in hearing. Subsidence of the acute symptoms of infection of the ear is of course obvious, but the fact that an impairment of hearing is being resolved at the same time can only be accurately demonstrated by audiometry.

"At this point the question might be raised whether otologic or audiometric examination should be done first. Ideally, careful otoscopic examination should come first. However, this might not always be feasible, particularly in large groups of children. Under ordinary circumstances, the establishment of a hearing loss would be the indication for referral to the otologist.

"If, fortunately, the canal is found impacted with cerumen, the solution of the difficulty is relatively simple. Such impactions are seldom responsible for a loss of more than 40 decibels. Removal of the cerumen is of course followed by immediate relief of the impairment.

"In the same way foreign bodies will cause an impairment depending on the size, character and duration of domicile of the object. An inflammatory reaction may be present, thus complicating the picture. Lay effort at removal may have traumatized the canal wall or tympanic membrane. Improper handling of these cases may result in serious consequences and this is of fairly frequent occurrence. The insertion of foreign bodies into the canal becomes almost a habit of some little children. Such a history from the parent may be extremely helpful

"By far the most common cause of a hearing loss in children is middle ear infection, acute, subacute or chronic otitis media; suppurative or non-suppurative. At the present time major concern is directed towards the acute, non-suppurative type of middle ear infection. It can be controlled by sulfonamide therapy. Subsidence of symptoms and fall in temperature follow sulfa therapy in almost routine fashion, but the true measure of successful treatment is a return to normal hearing in the affected ear or ears. All therapy of acute middle ear infection must be controlled by audiometric examination. When a return to normal has been sustained for a period of a week's time, the incident may be considered 'closed.' Without such evidence therapy and supervision must be continued.

"In the present discussion, mastoid diseases and its surgical treatment will be considered only to draw attention to the fact that a resulting hearing loss is usually permanent and irreversible. Chronic suppurative otitis media is unhappily still a common condition. It should be completely preventable.

"Acute infections of the nasopharynx, sequelae of the common contagious diseases, is preventable with intelligent handling. But the 'running ear' is still a matter for the otologist's concern. A great amount of data has been presented relative to the care of these cases by insufflation of iodine powder, of sulfonamide powders or by ionization. The sulfonamides in their micro-crystalline form are remarkably effective. However, a therapeutic agent alone cannot be expected to control this situation. The toilet of the ear-proper cleansing is essential. During such treatment, the patient's hearing level must be periodically recorded. Perforations are slow to close if ever, and as they approach closure, the hearing level improves or declines, dependent upon the condition of the middle ear. Since 'hearing' is the requisite, the only purpose of obtaining a dry ear must be measured by repeated hearing tests.

"The persistence of adenoid tissue rests in the posterior nasopharynx, tissue which cannot adequately be removed by surgical means, is responsible for a high percentage of aural difficulties in young children. Crowe and his co-workers* have focused attention on this condition and have reported at length on the beneficial effect of radon therapy. They have further demonstrated the occurrence of adenoid tissue rests in the eustachian tubes themselves which are of course quite inaccessible to instrumental removal. The effect of such radiation therapy is striking to a degree. It is one of the outstanding therapeutic measures for the correction of hearing impairments in children.

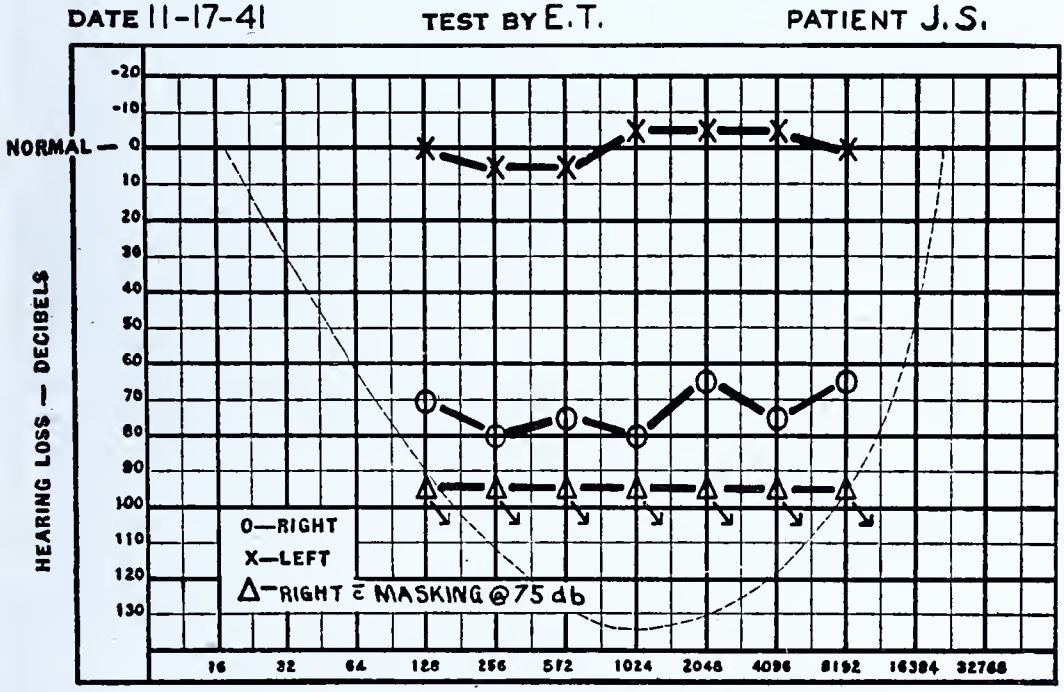


Figure 13. Complete Monaural Loss

"However X-ray treatment of this condition can be carried out with equal effectiveness. It would even seem to have some advantage. Though requiring several visits, it is entirely devoid of discomfort and can be used on little children without the necessity of general anesthesia. No untoward results have been observed in a considerable number of children so treated.** These cases must be carefully chosen and controlled. All children so treated have previously had tonsillectomy and adenoidectomy performed at least once, adenoid tissue was observed on nasoscopic examination in all cases.

*Crowe, Samuel; Guild, Stacy R.; Langer, Ella; Loch, Walter E., and Robbins, Mary H: "Impaired Hearing in School Children." *The Laryngoscope*, 52:10, 790-804, October, 1942.

**Sixty-five roentgens are administered over the course of either tube using the following factors: 5 milliamperes; 130 kilovolts; 6 millimeters aluminum filtration; 40 centimeters distance. Over the six weeks' period, 390 roentgens is administered over the course of either tube. With the machine used, 65 roentgens are 10 per cent of a saturation dose. This specific technic has been developed by Dr. J. Donald Zulick, Roentgenologist-in-Chief, of the Abington Memorial Hospital.

"Occasionally equally striking results are obtained with tonsillectomy and adenoidectomy alone. But such improvement can only be safeguarded by careful follow-up audiometric examinations. X-ray or radium therapy is always in reserve if further difficulties develop.

Reference has been made elsewhere* to the relationship of unilateral or bilateral hearing loss in children to the disease parotitis. Careful audiometric studies alone can indicate the nature of the loss, a perceptive deafness in every instance. Figure 13. Following the recognition of a hearing loss in one ear this patient was treated elsewhere with inflation and bouginage for several months. No audiogram was made. When the type of loss was definitely established the patient could of course be spared further unnecessary and useless treatment. Periodic audiograms throughout the adolescent period serve as a check on the hearing in the unaffected ear in such cases of unilateral deafness.

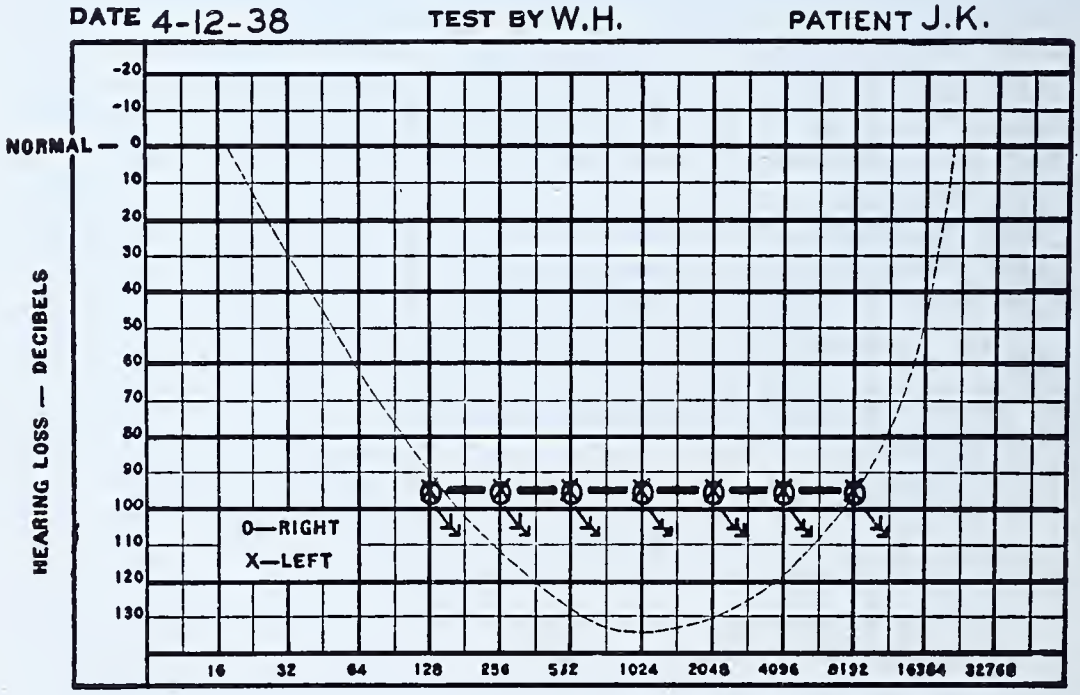


Figure 14. Complete Binaural Loss

Fortunately malignancy affecting the ear in children is an unusual condition. Figure 14 is the audiogram of a boy seventeen years of age who had been treated for bilateral furunculosis of the external canals. As indicated there was a total loss of hearing in both ears which had come on gradually. Biopsy revealed X-ray therapy has controlled the condition completely but the hearing loss remains unchanged. The otic capsules were destroyed.

*Hughson, Walter: "Unilateral Deafness." *The Laryngoscope* (in press).

Summary

In view of the greatly awakened interest of laymen, educators and the medical profession itself in the problems of the hard-of-hearing child, it has seemed appropriate at this time to emphasize the role of audiometry in the total picture.

The initial phase of the problem was largely a statistical one in which large groups of children were examined in different cities in the country and a relatively uniform morbidity per cent was established. However, follow-up and otologic care of the cases discovered did not keep pace with the primary effort and there ensued a waning of general and specific interest.

Obviously, the most fertile field for effective therapy is in the child-age group. Hearing surveys now will be carried out with the definite purpose of referring the child through the family physician to establish otologic clinics where appropriate therapy can be instituted. These clinics will assume a very real responsibility. The care of the children referred must be of the highest order and the data thus obtained should be of great significance in the future development of the therapy of hearing losses in children. Such care is dependent on the exact diagnosis of each individual case and an essential factor in achieving this end is a complete and careful audiometric examination. Too often therapy is considered effective if it arrests further progress of hearing loss. Such cannot be the case in dealing with children. A loss of hearing, except in conditions recognized as irreversible, should be improved. This should be possible in a high percentage of cases and here again the progress of the improvement should be followed. Intelligent therapy can be controlled in no other manner. Following the conclusion of therapy these children should be examined throughout their entire school career to safeguard the gain obtained and to anticipate any recurrence of the difficulty.

Conclusions

1. Accurate diagnosis of a hearing loss in children is an essential factor in setting up any therapeutic regime, and can be achieved only by complete audiometric studies in conjunction with general and special physical examination.

2. A record of the effect of therapy is essential. Not only are audiograms a measure of success, but they are the only reliable means of indicating the necessity for a change in the therapeutic procedure.

3. Following any type of treatment and regardless of its result, audiometric follow-up should be continued throughout the school life of the child.

B. LIP READING INSTRUCTION

The following material is included with the view to furnishing a practical approach whereby a person with no specific training to teach lip reading can attempt to help children whose hearing is impaired to develop this essential skill. Obviously, the suggestions given in this

bulletin cannot enable a novice to render the quality of service that an experienced lip reading instructor can give. There are thousands of hard-of-hearing children in the Commonwealth for whom no special assistance is available other than what the classroom teachers and members of the family can supply. In the absence of specially trained persons no parent or teacher should hesitate to attempt to train a child to read lips.

What Lip Reading Is

One of the most frequently quoted definitions is one given by Edward B. Nitchie, a pioneer teacher in this field, who defined lip reading as "the art of understanding a speaker's thought by watching the movements of his mouth." Since the term "lip reading" and the older conceptions of what it involves emphasize the importance of the lips and the mouth, many teachers have applied different names to their work. Actually, much more than the lips is involved in interpreting oral language through vision. Natural gestures, facial expressions, the particular work or activity of the speaker at the moment, the objects on which the speaker's eyes are focused, the general trend of preceding conversation or events—all are important in helping the deafened person to get the meaning of what is being said. In other words, the lip reader must be cognizant of total situations and constantly alert to a wide variety of clues. Names such as "speech reading" and "visual speech" have been substituted in order to imply the broader conception of what lip reading involves. The term "lip reading" is used in this bulletin since it is probably the one with which most of those who will use the following material will be familiar. Even though too much emphasis may have been placed on the lips and mouth in the past, the fact remains that they are important in lip reading. A lip reader may shift his eyes away from a speaker's face momentarily, but his attention is focused on the mouth practically all of the time. Other items get only momentary attention or remain in the periphery of the pupil's vision.

The Limitations of Lip Reading

In initiating instruction in lip reading it is important that the teacher and the mature pupil both be familiar with its limitations. People who have not had much contact with the deaf or hard-of-hearing are apt to feel that lip reading enables one to understand practically everything that is said in his presence. Although certain individuals do develop unusual skill in reading lips, this device cannot approach the usefulness of hearing. Very few expert lip readers can follow conversation when the subject changes frequently and when several people are participating. Good lip readers have difficulty in following lectures, especially when the material is new to them.

Through hearing and writing we have fairly complete representations of language. No one knows how much detail we actually see as we read printed material rapidly, or how much we really must hear in

order to understand conversation. Undoubtedly there are many more useful clues in both written and spoken language than we must have to understand them. This is not true of interpreting language by means of lip reading since the speech movements are not as clearly defined as their printed or spoken counterparts are. Many speech acts such as those involved in the production of *t*'s and *d*'s are identical in appearance, even though they sound different and are easily identified in print. The movements for other sounds such as the *k* and the *g* cannot be seen. In contrast to the full representations of language one gets through reading and hearing, the lip reader at best can get only an incomplete representation of oral language. He must constantly use his ingenuity in order to piece together the incomplete clues to get an approximation of what is said.

Knowing that lip reading is not as satisfactory as reading or hearing is useful to the teacher in evaluating the results of his work, it should not, however, discourage him from attempting to train a child with impaired hearing. Imperfect as his comprehension by lip reading alone may be, a pupil will be able to get along a great deal better with the help of lip reading than without it. Lip reading is one of the most useful and important aids for the deaf and the hard-of-hearing.

The Problem With the Hard-of-Hearing Pupil

As a rule the public school pupil who can profit from lip reading will have quite a bit of residual hearing. He will have developed a vocabulary and a considerable degree of language ability, which makes his problem quite different from that of the child who has never heard. Moreover, the hard-of-hearing child will already have acquired a certain amount of skill in lip reading as every person who learns to speak does. The teacher, then, will be developing further a skill which has already been initiated rather than starting something entirely new. The problem is essentially one of beginning with material which is simple enough so the pupil can have some success with it and gradually increasing the difficulty of the practice situations. It must be kept in mind that beneficial practice will be had only when the child is succeeding with the material. This means that frequent review of lessons is important. Introducing new situations too rapidly can interfere with the pupil's progress.

Practice Periods

The length of practice periods as well as their frequency must necessarily depend upon the amount of time which can be set aside for an individual pupil. The classroom teacher and parent will do well not to start out too ambitiously with a program which cannot be continued. Any benefits from instruction will come gradually as the cumulative results of regular practice periods held over a long period of time. Even though no more than three minutes can be set aside during each school day such a schedule can, when followed faithfully for at least a year or two, develop creditable skill in reading lips. The first recom-

mendation is for a daily practice period, even though only a few minutes can be reserved for the work. An alternate recommendation is that longer periods be arranged several times each week, possibly three five-minute lessons. Having one appointment of fifteen minutes per week is not as satisfactory but it can, nevertheless, be of great help.

There is an advantage in working with more than one pupil at a time. When there are a number of pupils in one building who need lip reading, small group classes can be held for one or two fifteen-minute periods each week.

In setting up a schedule it must be remembered that regularity of practice over a long period of time is the most important consideration. Any benefits are purely relative. Even very brief practice periods will be of value.

The Teacher's Voice and Manner of Speaking

The purpose of lip reading instruction is to develop a skill which will assist the pupil in understanding many people in a variety of situations. The teacher must be careful to speak as naturally as possible, both as far as the rate of speaking and the prominence of speech movements are concerned. Exaggerated activity of the lips, tongue and jaws should be avoided. There is always a tendency for the lip reading teacher to develop unnatural habits unconsciously when he is aware of the child's effort to understand him. A wise precaution is for the teacher to seat himself in a position so that he can glance into a mirror occasionally to observe his own speech movements.

Most of the children who will need lip reading instruction will have enough hearing so that when they are seated near the teacher they will hear his normal voice quite well. To be sure that the pupil is relying upon his vision it will be necessary for the teacher to use lowered tones or voiceless speech, which may make it more difficult for the teacher to speak with natural movements. In lowering the voice it must be remembered that in the usual whisper the unvoiced consonants are ordinarily pronounced as loudly as they are during normal speech. Care must be taken to make these consonants soundless as well as the vowels and voiced consonants. Many teachers find it easier to teach through the glass in a closed door or window so they can use low voice. It is somewhat difficult to control the teaching situation when this arrangement is used, although it is a good one for review lessons. Special care must be taken to be sure that a glare on the glass does not obscure the teacher's features.

Lighting and Position for Instruction

The teacher should sit or stand where his features will be well-lighted. The child should be between the teacher and the source of light so the visibility of the face will not be reduced by a bright background. The most favorable position for reading the lips is less than ten feet from the speaker.

Although the teacher must give the instruction from a position from which his face can be seen by the child, he should not maintain a stiff or fixed attitude. It is much more satisfactory to move the head naturally, nodding and glancing in appropriate directions as the lesson material develops. One of the reasons for suggesting the use of pictures and objects in the practice materials given below is that they will require gestures and natural head movements. For the initial work, or until the child has developed skill in observing critical clues for lip reading, the teacher and pupil should sit facing each other. Later there is an advantage in moving about, either indoors or out, so the child can have the experience of adjusting his position frequently in order to get one which is favorable for lip reading. With a small child the teacher's face should be on the level with the pupil's for at least a good share of the practice.

Practice With Different Individuals

It is not an unusual experience to find a pupil who will read the lips of his teacher successfully and still be unable to understand other people. To prevent such a circumstance it is important to arrange for the child to practice with as many different individuals as possible. Parents, other teachers or classmates may observe lessons and repeat the procedures later. Where several teachers in a building are training pupils to read lips, an exchange of pupils can be worked out or the teachers may alternate in working with the pupils as a group. It is very important that a child not have all of his instruction and drill from one individual.

The Attitudes of Other Children

From the standpoint of encouraging a youngster with impaired hearing to have an unemotional acceptance of his problem it is advisable to conduct some of the practice periods in the presence of other pupils or members of the family as long as this does not prove too distracting. Most of the procedures can be much more natural if other children are included in them. Several of the games suggested below can be used for a whole grade. This general participation can be of benefit to the normal youngsters as well as to the handicapped child. The hard-of-hearing child will gain a feeling of security from knowing that his difficulty is accepted and understood. The normal child will learn to be considerate through his insight into what a hearing loss means.

Keeping a Note Book

Since training a child to read lips ordinarily involves several adults, some record or log of practice periods should be kept. When two teachers, or a parent and a teacher cooperate in the instruction it is advisable that one person assume the leadership and the other furnish additional practice, using the same drill materials. A record makes it possible to coordinate efforts without frequent conferences. The record also furnishes a means by which the teacher can tell whether or not the

drill material as offered, furnished a sufficiently wide variety of experience. Even though items as brief as the following are entered in a notebook, a useful record will result.

> "5/10/44—Drill with short statements about passing cars while sitting on the lawn."

Suggestions for Practice Materials

The following suggestions for practice materials are arranged in three divisions, so that the instruction in lip reading by this plan may be thought of as consisting of three steps. The first two steps are arranged with the view to developing fluency and continuity, using a straight language approach. The third step is designed to develop skill in using clues which will increase the accuracy of comprehension. These steps are not necessarily the ones a specially trained teacher would use, but they do represent a practical sequence which has proved usable for the untrained instructor.

DIVISION ONE—BEGINNING EXERCISES

The exercises included in the first division represent a variety of situations in which the pupil will be expected, in most instances, to repeat single statements which the teacher gives using voiceless speech. In the beginning, series of sentences are not given without interruption except when reviewing a particular exercise in which ideas were first expressed singly.

The only practice which will be beneficial will be practice in which the pupil is successful in understanding most of what is said to him, so it is important that the drill situation be explained carefully before it is used. In this and other divisions visible clues are furnished as frequently as possible. If a child does not understand a statement it should be repeated, with voice, and after that repeated several times without voice. Since the clues are presented so obviously and since the statements are short the pupil can be expected to repeat them almost verbatim.

It is suggested that at least six months be spent on the material in the first division. With frequent review, which is very important, the material given below and simple adaptations of it are easily sufficient for a year's training or more.

1. *Use of Idioms.*—The understanding of idioms is very important to the success of a lip reader in conversational situations. Some idioms should be included in each lesson, either in a formal way, or they may be incorporated into conversational situations. One way to use them in the formal way is to say, "Supposing I am meeting you on the street in the morning. I could say any of these things. Can you tell me what they are?" Then give him a variety of such expressions as, "Hello; Good Morning; 'Hi'; How are you?; How are you today?; How are you this morning?; Hello, Robert"; etc., having him say each one aloud after you. Other idioms suitable for greetings at other times of

the day and expressions of farewell, apology, regret, desires, etc., can be used in the same way by introducing them in connection with concrete situations. Another method of presenting the idioms formally is to have a series of them written on paper or on the board and have the pupil point out each one after it is said.

2. *Use of Objects.*—Small objects that can be held in the hand have many advantages for use in initial instruction:

a. They furnish a situation in which most beginners succeed since the clues for the ideas expressed are so obvious.

b. Having a light object which the teacher can handle easily and use in gesturing helps him to move his head and shift his eyes naturally.

c. The pupil gets practice in reacting to a total situation while focusing the greater amount of attention on the teacher's lips.

In introducing an exercise the teacher can tell the pupil that he is going to talk about the ball, if a ball is being used, and make such statements as these:

This is a ball
It is a red ball
It has a black ring
I toss the ball up in the air
I bounce the ball

He can perform each described act and point out the critical parts of the ball as he speaks. This particular type of exercise is as successful with adults as with very young children. There are enough appropriate objects to make it possible to continue with such practice almost indefinitely and to meet any level of interest or maturity.

3. *Use of Pictures.*—Pictures may be used very much as objects in furnishing clues for simple lip reading situations. The pictures are a little more difficult to gesture with, but they do furnish possibilities for much additional practice material to supplement the objects.

4. *Use of Known Combinations or Sequences.*—Any combination of numbers, names or words which the pupil has memorized make excellent practice material. Examples are:

The days of the week
The months of the year
Counting by ones
Counting by fives or by tens
The letters of the alphabet
The words of memorized poems, riddles or songs

A variation in this practice which helps to keep the pupil alert is to stop abruptly in the midst of a series and have him furnish the words or numbers which should follow. Another variation is to insert a wrong number or word occasionally and have the child primed to call such errors to the teacher's attention.

5. *Use of Speaking in Unison.*—One system of teaching lip reading, the Jena Method, is based upon the idea that a pupil can learn to make all of the speech movements along with a speaker. He is then supposed to be able to understand what has been said by interpreting the movements and pressures of his own speech organs. Whether or not the basic idea of the Jena Method is tenable, one of the best ways of getting a pupil to pay close attention to the speech movement is to have him repeat known combinations such as are suggesed in item 4, immediately above, in unison with a speaker. At first the various combinations should be repeated in their usual sequence and rhythm. Later the teacher should change the timing and accent in his own voice and instruct the pupil to make the variations along with him, as, instead of counting along with an even rate, the pattern, "One, two, *three,* four, five, *six,* seven, eight, *nine,*" with an accent on every third number, can be introduced. In addition to varying the rhythm, the teacher can introduce numbers or words out of their expected order. These variations should be introduced gradually until the child reaches a stage at which he adjusts to the changes readily. In the beginning both the teacher and the pupil should use normal voices. After several weeks' practice using normal voice they should gradually quiet their tones until both are using voiceless speech. A teacher may have a pupil continue to reproduce the speaker's movements in all practice situations. Many lip readers develop the habit of imitating the speaking activities of others without being told to do it.

6. *Use of Words and Sentences.*—Excellent practice situations can be built around lists of words and sentences which are written on the board or on small cards. The teacher reads the sentences or words, one at a time, not necessarily following their given order, and the pupil points out or repeats the given sentences or words. The teacher also may make sentences using one or more of the words in a list and the pupil can indicate the words from the list which were used. Such words should be the key words in the teacher's sentences.

7. *Use of Simple Conversation.*—By a simple variation the material in items 1, 2 and 3 can be used in conversational situations. Instead of having a child repeat an idiom as, "How are you?", he can answer, "I am well. How are you?" and the conversation can go on from there. The replies of the pupil are a fairly accurate indication of his success in interpreting the voiceless speech.

8. *Use of Games.*—Practice can occasionally be enlivened by hiding small objects in various parts of a room and having a pupil rely upon his lip reading to understand the clues for the location of the objects. The first statements should be simple. There is an advantage in the beginning in hiding a number of identical articles so the sentences can be much alike, as, "There is a paper clip by the pencil sharpener, there is a paper clip under the plant," etc.

Guessing games are adaptable. The teacher can tell the pupil that he is thinking of some one thing, as, of something on his desk, of another pupil or of a piece of furniture in the room and then proceed

to help the pupil to guess what he has in mind by giving him brief, descriptive clues, as, "I am thinking of something that is sharp at one end and has an eraser on the other end."

9. *Drill on Specific Words.*—Research in the field of lip reading has demonstrated that lip readers do recognize individual words—that word recognition as such is an important part of lip reading. Divisions one and two of the material on lip reading are designed to build up a basic vocabulary of words which the pupil can recognize, using the direct language approach. Ordinarily, it is necessary to furnish additional practice for the recognition of specific words. In providing drill with individual words, the teaching problem can be thought of as falling into two areas:

a. Drill on Words With Which the Pupil Is Familiar, But Which He Does Not Recognize in Lip Reading: Many of these words will be difficult for any person to recognize because the sounds of which they are composed are formed back in mouth where they cannot be seen, or because the words may be confused since they look alike, as "pail" and "mail." There is no advantage to be gained in drill on such words. However, there are others which should be recognized but are not. A portion of the pupil's notebook should be reserved for compiling a list of the latter words, and he should be given them when they are pronounced individually as well as when they are used in a variety of sentences.

b. Drill With Unfamiliar Words: It may be said axiomatically that words with which a pupil is not familiar cannot be functional parts of his lip reading vocabulary. Since the expectancy is that the child with impaired hearing will have a limited vocabulary the teacher must be particularly careful to see that he knows the meanings of words. The pupil should be instructed to call each word he does not understand to the teacher's attention. The teacher should compile a list of such words as they come up in the individual lessons or in the work of the regular school day. After complete explanations of the words, the pupil should be given practice in reading them from the lips as they are pronounced individually, or used in context. Such a list of words should be reviewed frequently.

Drill on specific words as suggested above in points "a" and "b" should be continued as long as the pupil is given instruction in lip reading. While the teacher is following the procedures recommended in divisions one and two, this practice on words need not be given major stress, but in connection with the work suggested for division three it should be given major emphasis.

In selecting material for a particular lesson a teacher probably will use parts of several of the given items. Idioms (item 1, page 90) will be included either formally or informally in every meeting. Items 4 and 5 ought to be used extensively during the first several months. Immediately following is a sample lesson plan which might be followed

in one of the first periods with a child under ten. A teacher will probably never draw up a plan in such detail or even have written plans at all. Details are included below for the sake of clarity in this presentation.

PLAN FOR JACK SMITH

Date—May 12, 1944
Length of period, 10 minutes

I. Use of Idioms:

Instruction: It's raining outside. I'll tell you things about the rain and you tell me what I say.

Statements:

1. It's raining outside.
2. There are drops of rain on the window.
3. Did you walk in the rain?
4. Did you get wet?
5. Are your feet wet?
6. Your shoes look wet.
7. Let me feel your shoes.
8. Yes, they are wet.
9. Are your socks wet?
10. Let me feel your socks, etc.

II. Use of Known Combinations:

Instruction: I'm going to count. You tell me how far I count.

Counting:

1. One, two, three.
2. One, two, three, four, five, six, seven.
3. One, two, three, four, five, etc.

Instruction: I'm going to count some things. You tell me what I count and how many there are of them. I'll touch some things and point to the rest.

Statements:

1. I'll count the buttons on my coat: one, two, etc.
   Questions: What did I count? How many were there?
2. I'll count the books on my desk: one, two, etc.
   Questions: Same, etc.
3. I'll count the windows: one, two, etc.
   Questions: Same, etc.

III. Use of Objects:

Instruction: I'm going to see what I have in my pocket. I'll talk about whatever I find and you tell me what I say.

Statements:

1. I have a key.
2. This is a key for that door
3. I lock that door at night.
4. I have another key.
5. This is a small key.
6. This is the key for my car.
7. I have some money.
8. This is a penny
9. I have one, two, three, four, five, six pennies.
10. There are six pennies.
11. This is a nickel
12. There are one, two, three nickels.
13. There are three nickels, etc.

Review:

Instruction: Now I'm going to say all of the things I said about the keys and money. You try to understand me.

Statements: I have a key. This is the key to my door, etc.

IV. Use of Idioms:

Instruction: It's time to stop now. I'll say something about being through. You tell me what I say.

Statements:

1. We are through.
2. You did very well.
3. Are you tired?
4. You can go home now, etc.

DIVISION TWO—FURTHER PRACTICE FOR FLUENCY

The second division differs from the first in that series of statements are presented to the pupil at one time instead of being presented singly. Rather than being expected to give each statement back to the teacher, the pupil summarizes the ideas he gets from each exercise. In much of the practice the pupil should be permitted to interrupt the teacher when he becomes lost, but there also should be a considerable amount of practice in which such interruption is discouraged, since the lip reader must become accustomed to not understanding everything. He needs experience and guidance so that instead of giving up when the ideas are not clear he will continue to attempt to follow the speaker in order to grasp as much of the whole meaning as possible.

In the beginning it will be well to introduce sequences of statements as a part of a practice period, but using exercises from the first division

for the bulk of each lesson. All of the materials in the first division can be adapted for use in the second.

1. *Use of Idioms.*—Idioms can be introduced either formally or informally, making use of longer statements than were given in division one, and using several statements at a time.

2. *Use of Objects.*—In presenting objects in the second division a series of longer statements can be used about each article. Instead of being purely descriptive in nature the statements can include related ideas, as, if a watch is being described, details of its purchase or repair may be introduced.

3. *Use of Pictures.*—Pictures which suggest a story are very useful in this stage of the training. Cartoons, comic strips or posters can be explained in detail.

4. *Use of Known Combinations.*—Longer sequences can be taken than were used in the first division. Whole units with which the child is familiar, such as the Lord's Prayer, the Gettysburg Address, or longer poems may be used.

5. *Use of Partially Known Combinations.*—Stories, lessons or poems with which the child is quite familiar, but which he cannot know verbatim are useful. In introducing stories, the very familiar ones should be taken first, gradually progressing to those that are less familiar. Stories like "The Three Bears" are excellent, and seem to be as usable with adults as with children. A gradual approach should be made to material which is practically new. Stories or articles may be read if the teacher is careful not to conceal his face while looking down at the book.

6. *Developing Topics.*—Topics for discussion may be introduced by giving the subject aloud, as, "I am going to tell you about the program we had yesterday," and then proceeding to describe the program.

7. *Use of Conversation.*—In conversation the teacher can develop more complicated ideas instead of limiting himself to thoughts that can be presented in single statements. A useful variation is to have a third person participate, possibly another pupil. Both pupils should use normal voice for their parts of the conversation, but the teacher should use a very quiet voice or voiceless speech.

DIVISION THREE—WORK WITH ELEMENTS

The subject of the importance of elements* or divisions of the speech act in the process of reading the lips as well as in the teaching of lip reading is a controversial one. Some methods of lip reading are built almost entirely around teaching a pupil to recognize particular sounds or movements. Many teachers contend that such stress on elements can make a pupil too conscious of position and movement, and that by becoming analytical, or aware of details, he never gains fluency in lip reading. Fluency in lip reading is of prime importance and it is

*Elements may be variously thought of as consonants; vowels; words; or positions and movements of the lips, tongue and jaw.

because of this importance that the first two divisions of this material stress the establishment of fluency through the direct language approach. Nevertheless, there is ample evidence to show that once fluency is established, that stress on elements improves the accuracy of the lip reader's comprehension. The third division stresses work on elements.

The following suggestions for drill on the elements are given in what is conceived to be the order of their relative importance:

1. *Drill With Specific Words.*—After two years of persistent training in lip reading most pupils reach a plateau of achievement in the skill as such. Thereafter, improvement in understanding speech is more apt to come through a growth in general language ability than through continued drill in lip reading as such. Since the acoustically handicapped pupil does experience difficulty in developing vocabulary, further practice should emphasize this phase of his development. As new subjects and reading materials are encountered in his school progress, he and the teacher should compile lists of these unfamiliar words. As he matures, the pupil should be given more responsibility for adding to the list, as well as getting correct pronunciation and meanings from the dictionary. Daily practice in recognizing these words as the teacher pronounces them singly, using voiceless speech, should be furnished. The drill should include recognizing these words in sentences and discussions. There should be frequent review of the lists of words.

2. *Drill for Vowel Discrimination.*—Write a series of words which are alike except for the vowel elements on the board or a card. Pronounce these words using voiceless speech and have the pupil point out or repeat each word as it is pronounced. Make sentences using the words and have him indicate the words used. Several suggested lists for such practice are given below. Others may be found in the speech books listed in the bibliography given on page 126.

men	hit	mate	came	rim	she	bite	tim
mean	hat	meat	come	rhyme	shay	bat	tame
mine	hut	might	cam	roam	shy	but	time
moan	height	moat	comb	room	show	beat	tom
moon	heat	moot		ram	shoe	bait	tomb
man	hot	mit		rum	pshaw	boot	team
min		mat				bit	tam
		mutt				bet	tum
		met				bought	
						boat	

3. *Vowel and Diphthong Recognition.*—Exercises for vowels and diphthong recognition are frequently built around lists of words containing the same vowel. Several illustrative lists are given below:

book	boat	mice	house	toy	man	luck
cook	broke	mine	mouse	join	can	hut
brook	soak	ride	shout	oil	tan	but
nook	oak	side	found	boy	fan	mutt
shook	note	hide	how	soil	ran	cut
took	coat	right	plow	voice	ban	buck

The pupil may be instructed to select words from a list similar to one of those above as the teacher pronounces the words, using voiceless speech, or as he uses the words in sentences. Word lists, sentences, paragraphs and poems in which certain vowels occur frequently are found in all of the speech books listed on page 127.

4. *Drill for Recognition of the Consonants.*—Drills for recognition of the consonants are organized very much like those for vowel recognition. Lists of words containing the same consonants in either the initial, medial or final position are presented by the instructor who uses voiceless speech. Sentences and paragraphs which contain a large number of any particular consonant are, ordinarily, presented after the drill on the word lists. All of the speech books listed on page 127 contain material which is well organized for such drill on the consonants.

The purpose of the drill on the consonants is to get the pupil to associate certain phonetic values with particular words. The consonants are frequently presented according to the most prominent activity involved in their production, as, *m, p* and *b* are given as "lip to lip" sounds; *w* as an "open lip" sound; *f* and *v* as "lip to teeth" sound and *th, t, d, s, z, sh, ch, zh, j, n* and *l* as tip of the tongue to palate sounds.

In drilling for the visual recognition of any particular sound, either vowel or consonant, the teacher should give very little description of the speech movements to the pupil, since it is extremely difficult to describe accurately the visible clues for the different sounds. Defining particular clues may encourage artificiality in the teacher. The safest procedure will be for the teacher to present the vowel exercises with description, using normal speech movements, and allow the pupil to determine his own visible clues. The consonants may be described briefly as suggested in the preceding paragraph.

Drills which would require visual discrimination between consonants which have similar movements should be avoided since they could only be confusing. The sounds *m, p* and *b* can be discriminated from *w, f* and *v,* but they cannot be discriminated from each other. Tip of the tongue sounds can be discriminated from lip sounds, but not from each other. There is little point in drilling on the *k, g* and *ng,* since they cannot be seen.

A teacher should plan to spend from a year and one-half to two years on divisions one and two. The exercises suggested in division three should, ideally, be continued as long as the pupil is in school. The parts of division three which deal with drill on specific words and drill for vowel discrimination have definite value which has been demonstrated experimentally. The value of prolonged training for discrimination of the consonants has not been proved. On a long-term basis the emphasis should be on the drill on specific words.

As was stated earlier in this section, any values to be gained from instruction in lip reading are purely relative. The best results will come from a program extending over the child's complete school career. However, any assistance given during a part of his school life will be of real help.

C. SPEECH INSTRUCTION

Hearing is the most important of the sensory controls of speech, being much more precise than either feeling or vision in this respect. The expectancy is, therefore, that some change in speech will result from hearing impairment. The type of speech variation which will result from a loss in hearing is not entirely predictable, but the following factors are determinants:

1. Degree of loss.
2. Type of loss, i.e., conductive or perceptive, loss for high or low tones, etc.
3. Duration of loss.
4. Age at which loss occurred.
5. Stability of the individual's speech pattern.

The reasons why the degree of hearing loss should affect the resulting speech abnormality are so obvious as not to warrant discussion. In regard to the importance of the type of loss, a person who has a conductive impairment, but whose inner ear is relatively intact will continue to hear much of his own speech by bone conduction, and he will consequently tend to retain more normal speech than a person who has a perceptive impairment. Ordinarily, the change in speech begins gradually some time after the hearing is affected and the amount of variation in the speech is roughly proportional to the period over which the loss is sustained. The speech of a child who encounters his hearing impairment before he learns to talk or while he is learning to talk will be more extensively affected than the speech of a child who develops speech completely before the loss occurs. The "stability" of the individual's speech is a term which is applied to a variable condition which cannot be explained completely. For some reason certain persons retain almost normal speech over a period of years in spite of profound losses, while the speech of others whose losses are less severe show almost immediate deterioration.

The deviation in speech resulting from a hearing loss may vary from the omission or mutilation of a few sounds to so complete a breakdown of the speech pattern that it is entirely unintelligible. Many stop talking. The following are essential consecutive steps to be taken in initiating the speech training.

1. Analyze the speech problem.
   a. Use a complete articulation test* to determine which consonants are omitted and which are produced inaccurately.
   b. Check all of the vowels to evaluate the clarity of their production. The articulation tests referred to in point "a" above are satisfactory for this purpose.

*Articulation tests are included in all of the speech books which are listed in the bibliography on page 126.

c. Evaluate the voice quality, considering the following items:
   1. Is the voice too weak?
   2. Is the voice too loud?
   3. Does the voice drag?
   4. Does the voice have adequate pitch variation?
   5. Does the voice sound dull?
   6. Does the voice lack normal vitality or expression?

d. Listen to the pupil as he reads aloud and speaks in order to determine which errors or variations are used consistently and which are used only occasionally.

e. Keep a written record of all of the noted speech deviations.

2. Select one phase (consonants, vowels or voice quality) on which to begin to work, basing the choice on the most prominent need. Unless a considerable amount of time can be devoted to the speech training it is wise to work on only the one selected phase or sound until it is cleared up or until it is improved as much as possible before going on to another.

SUGGESTED PROCEDURES FOR SPEECH TRAINING

The Use of a Speech Reference Chart

Lacking precise hearing to control his speech, one of the most useful devices for training or maintaining good speech in an acoustically handicapped child is to build up a reference chart such as is given below. The complete chart contains all of the essential vowels and consonants of the English language, plus drills for volume and pitch control. Shadings of the *a* and *ä* are omitted since they are confused even by normal speakers. With the hard-of-hearing child one is interested in intelligibility rather than in perfection.

Carrier words* are included with all sound elements. These carrier words must not necessarily be the same for each pupil. The words should be selected from the child's own oral vocabulary, each word being one in which he uses the critical sound element correctly or at least more nearly correctly than he uses it in other words.

The carrier words should be practiced consistently in every speech lesson so that each critical sound can be produced easily and accurately in those words. The frequent practice is important so the pupil will not forget how to make these sounds. In improving the pronunciation of a word not on the chart the teacher explains the correct sounds of the new word by associating them with the corresponding parts of the chart. In other words, the chart becomes a standard reference for the pupil. He relies on his memory and feeling for the critical sounds on the chart and refers back to them in order to use the sounds properly in other situations. Further instructions for using the chart are included below in connection with specific speech drills.

*A carrier word is a word containing a sound which is being trained. As, if the *o* were being trained, "hold" would be a carrier word for it.

A complete chart should be constructed for any pupil having a loss averaging 25 decibels or more for frequencies 256, 512, 1024, 2048 and 4096, or if he has a smaller loss which is expected to increase. The chart should be presented as early as possible, so that the pupil can remember carrier words rather than having to learn them.

SPEECH REFERENCE CHART

Vowels, Diphthongs

ā pay	ē eat	ō old	oi oil	ī ice	ū you
ă ask	ĕ met	ŏ on	ou how	ĭ it	ŭ us
ä are		o͞o moon			
		o͝o book			

Consonants

	whispered	voiced
labial	*p* pay	*b* boy
	f fun	*w* (o͞o) was
		v van
nasal		*m* man
		n no
		ng doing
plosive	*t* toe	*d* do
	ch chew	*j* jaw
	k (*c*) come	*g* go
fricatives	*s* (*c*) so	*z* zoo
	sh show	*zh* azure
		l low
		r ray

Volume	*Pitch Change*
How are you? *loudly*	How are you? *rising inflection*
How are you? *conversational tone*	How are you? *lowered inflection*
How are you? *quietly*	
How are you? *whisper*	

Voice Quality

1. Volume:
   a. The pupil whose hearing status will permit his remaining in the regular class will have sufficient residual hearing to be useful in controlling volume. He will usually speak more quietly or more loudly than he should because his voice will

not sound the same to him as it will to others. It is not likely to be necessary to teach him how to speak loudly or quietly, but how to gauge his volume. In controlling the intensity of the voice it is useful to provide drill during each practice period in reading such a statement as is given under the section on volume on the speech reference chart on page 97, using the four indicated volume levels. After the pupil is able to read the statement at the different levels at will, he should be given practice in conversing and reading aloud in an effort to keep the voice at one of the levels indicated. The point is to train the pupil to use reference levels of loudness and to give him supervised practice in maintaining these levels in different speaking situations.

b. If a recording machine is available it can be used as a visual aid to control the voice level. The pupil can speak and read into the microphone while watching the needle on the volume indicator. He must be told what excursion the needle should make when a desirable intensity is used and he can attempt to keep the needle at approximately the right point.

2. Rate of Speaking:

a. Pupils with impaired hearing sometimes develop a slow, labored speech. On the other hand, those who lose their hearing suddenly and completely often begin to speak so rapidly that it is very difficult to understand them. One way to train a proper rate of speaking is to converse with the pupil. When he offers a statement too rapidly or too slowly tap out his incorrect rhythm for him and then tap out a more normal rhythm, having him repeat the statement using the corrected pattern. In presenting the proper rhythm the teacher should tap out the corrected tempo on the pupil's arm or hand.

b. Read poetry and prose aloud with the pupil, tapping out the correct rhythm for him. When the pupil gets so that he can follow the teacher's timing satisfactorily the teacher can stop reading, allowing the pupil to continue alone, attempting to maintain the rate which was set for him.

c. After the pupil seems to have developed the feeling for a satisfactory rate for reading, draw him into conversation, instructing him to attempt to maintain approximately the same tempo used in the oral reading.

d. Speech may appear to be too rapid when a person is omitting or slurring many sounds. Such a speech problem should be attacked by drill in saying words and statements completely. Tapping the syllables or words in the manner suggested above is useful in encouraging careful speaking.

3. Variation in Pitch:

a. If the pupil's voice tends to be monotonous, a part of each practice period should be devoted to reading the statement given under the section on pitch change on the speech refer-

ence chart, using the inflections indicated, until he can read it correctly. While he is practicing the reading it is essential that both the pupil and the teacher evaluate each effort, with the pupil attempting to repeat successful efforts. Proper inflections for the statement will probably result from the pupil's remembering how he produced satisfactory inflection accidentally during his various attempts. This memory must serve as a reference for using inflection in other situations.

b. Have the pupil give series of words or numbers using a low pitch for the first one and raising the pitch for each successive word or number. This exercise should be repeated during each practice period until the pupil can say words on six distinctly different pitches. Care must be taken to see that the pupil says each word rather than sings it.

c. Reverse the procedure given above by having the pupil begin with a high pitch and lower his pitch as he says each of a series of words or numbers.

d. Practice reading words and sentences, ending them with rising or lowering inflections. The raised inflection can be indicated by an arrow pointing up and a lowered inflection by an arrow pointing down.

e. Make a list of statements the pupil may be expected to use frequently during a day. Indicate proper inflection by arrows as described in point "d" immediately above. Practice reading the statements using the indicated inflections.

f. Drill to encourage the use of natural expression and emphasis will often automatically result in better use of inflection. Having the pupil repeat statements made by the teacher as he holds his hand on the teacher's cheek helps to train natural inflection.

4. The Dull Voice:

The "head in a barrel" tone which characterizes the voices of many hard-of-hearing persons is frequently the result of reduced rate and energy in speaking. Introducing more energy into the voice increases the high frequencies, thus offsetting the dullness usually noted.

Vowel Quality

1. The speech reference chart is one of the most useful means of improving vowel quality. Running through a pupil's vocabulary usually reveals words in which the various vowels are used correctly or nearly correctly. A series of words in which each vowel is satisfactorily clear should be selected and used as the carrier words for the chart. The pupil should drill on these words during each practice period in order to use his feeling and partial hearing to get a correct value for each vowel. These vowels can be introduced in connection with other words by pointing out the carrier words in which he produces the sounds cor-

rectly and explaining that the sounds desired are the same as those indicated on the chart.

2. The vowel tones have considerable power or sound energy, and hearing in the low frequencies is useful in distinguishing them. Consequently, it is to be expected that a pupil who will continue in his regular class will have residual hearing which can be utilized in improving the vowels. He should be given considerable practice in listening to the vowels used by the teacher and in comparing them with his own. He cannot hear them as a normal person would, but he should use his hearing to the utmost.

Using an ordinary megaphone will increase the sound energy reaching a child's ear by as much as 40 decibels. The teacher should make use of a megaphone and speak while his lips are close to the pupil's better ear in order to help him to make the best use of his hearing.

Consonants

1. General Considerations:
   a. Speech training should be offered in the most easy and natural way, and whenever possible a very simple approach should be used in preference to a laborious or abstract one. Hearing is one very simple and natural control of speech. The teacher should in every case make the greatest possible use of a pupil's residual hearing before taking more laborious measures to improve the speech. By using a megaphone or speaking with the lips close to the pupil's ear, the sound energy will often be sufficient for a child to hear sounds which he cannot hear in ordinary situations. He should be given extensive drill in listening to sounds the teacher produces and in comparing them with those he uses. If consistent effort to make use of the residual hearing proves to the teacher that the child cannot hear a particular sound, other teaching methods must be tried for that sound.
   b. If a pupil's hearing loss has not been in existence long, his memory for correct articulation may prove to be an effective and simple means of improving his speech. Frequently, simply calling omissions or inaccuracies to his attention during practice periods is sufficient to improve the speech.
   c. When neither the memory for the correct production of a sound nor the residual hearing are adequate for teaching a sound imitation, voluntary placement, tactual and pressure clues as well as activities or stunts which require movements similar to the desired speech activities should be drawn upon. Ordinarily, it is necessary to use the combined values of all of these devices.
2. Imitation:

   In teaching the correct production of a sound through imitation the teacher should avoid detailed description of the speech

movements in as far as possible. Seat the child so that he can see the teacher's face and observe his own features in a mirror at the same time. The teacher should pronounce the consonants in a natural manner, being especially careful not to distort his speech in order to make the movements more visible, as by protruding the tongue for the whispered *th*. Sounds which the child cannot imitate through vision alone must be taught by other means.

3. Voluntary Placement:

Consciously controlled movements of the tongue are difficult and tiring. Frequently simple devices can be arranged which will accomplish certain activity without much conscious effort. For instance, placing a small piece of crumpled paper on the tip of the tongue, and after raising the tongue to the palate so the paper rests loosely between the tip of the tongue and the palate, blowing the paper out without moving the tongue will invariably result in a reasonably good whispered *th*. The essential movement for that sound is easily accomplished in this manner. In general it is always simpler to maneuver desirable activity by attempting "to do something" like blowing the paper than to consciously place the tongue in a precise position.

The consonants are produced by fairly exact adjustments of the speech organs and it is therefore easier to teach them mechanically than it is to teach the vowels. Although some voluntary control must be exercised over the speech act while new habits are being learned, it is wise to practice a movement until it can be accomplished easily and effortlessly before it is introduced as a part of the speaking process. Movements can be trained entirely independently of the sounds with which they are associated, and the relationships with the sounds should be established only after the basic movements are performed quickly and without effort. Exercises to develop skill in controlling the tongue movements are useful preparation for training speech movements. These exercises should not be taught indiscriminately, but selected in terms of the consonants on which work must be done. Practical tongue and lip exercises are suggested below. The usefulness of each exercise in training specific consonants is given under the discussion of the individual sounds which follows.

a. Tongue and Lip Exercises:

(1) Place the tongue so that the outer margin of its upper surface is against the hard palate and near the upper teeth, but not pressing against them. The sides and front of the tongue should be in contact with the inner surfaces of all of the upper teeth but not pushing against them.

(2) Place the tongue in the position described in exercise 1, and direct a light air pressure above the tongue so that the middle of the tongue

is forced down slightly, while the air is dammed up by the contact of the outer border of the upper surface of the tongue and the hard palate (not the teeth). The air pressure should be light and the pupil should try to get a "rubbery" sensation in the middle of the tongue as it yields to the pressure.

(3) Touch the tip of the tongue with a toothpick and then touch any spot on the hard palate with the toothpick, instructing the pupil to touch "that part" of the tongue against "that part" of the roof of the mouth.

(4) Place the tongue in the position described in exercise 1 and attempt to hold the sides of the back half of the tongue still while the tip and front half move downward, away from the palate, and then back up to the original position. As the pupil gains skill in this exercise have him attempt to move less and less of the front of the tongue, until only the center of the tip makes small excursions from the palate while the mass of the tongue is motionless. By adjusting a pocket mirror so that a part of it extends into the pupil's mouth he will be able to observe the movement of the tip of the tongue. If the pupil sits before a large mirror he can observe in it the movements of the tip of the tongue as they are reflected from the small mirror with less strain.

(5) Touch a spot on each side of the tongue about halfway back with a toothpick and then touch the sides of the palate adjacent to the second pre-molars. Instruct the pupil to place "those parts" of the tongue against "those parts" of the palate.

(6) Bend a straw so that it fits up behind the pupil's upper teeth and extends along the midline of the hard palate for about a quarter of an inch. Have the pupil grip the straw with the tip of the tongue and blow lightly through it. If the free end of the straw is placed in a glass of water the pressure of the blowing can be controlled.

(7) Bend the end of a straw so that when the pupil opens his mouth about a half an inch of the straw can rest along the midline of the front of the soft palate. Instruct the pupil to grip the end of the straw with the back of his tongue, holding the front of the tongue down, and blow through it.

(8) While the pupil holds his mouth open and extends his tongue, take a toothpick and touch a strip running the whole width of the tongue about two-thirds of the way back. Then touch a strip running the width of the soft palate, asking him to put "that part of the tongue" against "that part" of the roof of the mouth.

(9) Have the pupil close his lips lightly and then build up the air pressure in the mouth until he can feel the lips yielding slightly to the pressure. Then have him open his lips quickly so that the air escapes with a sudden puff. Have him hold the back of his hand up against his mouth so he can feel the escaping air.

(10) Place the tongue against the hard palate as suggested in exercise 1 and create the chamber of air between the hard palate and the upper surface of the tongue as suggested in exercise 2. Release the air suddenly by lowering the front of the tongue. Have the pupil hold the back of his hand in front of his mouth, so he can feel the escaping air.

(11) Pile the back of the tongue against the soft palate as is required in exercises 7 and 8. Build air pressure behind the tongue so that the back of the tongue will yield to it slightly. Release the dammed up air by drawing the tongue down suddenly. Hold the back of the hand up to the mouth to feel the escaping air.

(12) Holding the back of the hand up to the mouth, blow a steady, wide stream of air against it so that the air pressure can be felt over a broad area.

(13) Pursing the lips, blow against the back of the hand so that a thin stream of escaping air can be felt on only one small area of the hand. The sensation of the air pressure can be described as "the pressure of a sharp point."

(14) Holding the tongue behind the upper teeth and against the hard palate, blow a wide stream of air over the tip of the tongue. Hold the back of the hand to the mouth to feel the wide channel of air.

(15) Modify exercise 14 so that the width of the opening between the tip of the tongue and the palate is so narrowed that the escaping stream of air feels like a pin point as it strikes the back of the hand.

b. Suggestions for Teaching Specific Consonants:

m: The lips are closed lightly. Vibrations are felt if the fingers are laid lightly on the Adam's apple and at the bridge of the nose.

n: The lips are open and the tongue is in the position described in tongue exercise 1. Vibrations can be felt in the nose and larynx.

ng: The lips are open and the tip of the tongue is down. The back of the tongue is piled up in the position required for tongue exercises 7 and 8. Vibrations can be felt in the nose and the larynx.

p: Tongue exercise 9 produces a satisfactory *p.*

b: Same as for the *p,* except that the vibrations can be felt in the larynx.

f: The lower lip is in loose contact with the lower edge of the upper teeth. The subject blows, and the air escapes between the lower lip and the upper teeth.

v: The same as the *f,* except that vibrations can be felt in the larynx.

th (whispered): Drill on tongue exercise 6 for several days. Then remove the straw and have the pupil blow, pretending that the straw is in position. A satisfactory *th* usually results. Tongue exercise 14 can also produce a satisfactory whispered *th.*

th (voiced): Same as the whispered *th,* except that vibrations can be felt in the larynx.

t: Practice on tongue exercises 1, 2, and 10 in the given sequence form the basis of a satisfactory *t.*

d: Same as the *t,* except that vibrations can be felt in the larynx.

s: The *s* a shrill sound resulting from air escaping through a narrow opening between the tip of the tongue and the front of the hard palate. Using tongue exercise 6 as modified for the whispered *th* as the basis, the pupil can be instructed to narrow the opening through which the air escapes and to press the tongue against the palate more firmly. Such experimentation usually yields a satisfactory *s.*

An *s* is sometimes successfully taught by laying a piece of a thin rubber band along the midline of the front of a pupil's tongue so that the free end of the rubber hangs below his upper teeth. The tongue is then raised to the palate as suggested in tongue exercise 1. Explain to him that rubber band represents the position and the diameter of the opening through which the air escapes in making a good *s.* Grasping the free end of the band draw it out slowly and have the pupil attempt to blow through the space which the band occupied.

A good *s* frequently results from blowing while the latter part of tongue exercise 4 is being done slowly, using only a small portion of the tip of the tongue.

z: Same as the *s* except that vibrations can be felt in the larynx.

sh: Tongue exercises 6 and 14 form the basis of a satisfactory *sh.* When the straw is removed in exercise 6 and the pupil is instructed to imagine the straw is in place and to blow as though he were blowing through a straw, a whispered *th* results. If he narrows the opening slightly and blows a little harder the added sharpness produces a successful *sh.* The *sh* can be approached from the *s* by broadening the air channel or from the whispered *th* by narrowing the air channel between the tip of the tongue and the hard palate.

In experimenting to produce an *s* as suggested above, a student will frequently produce a good *sh* or *ch.* When he makes any good sound accidentally he should be encouraged to repeat it and the drill should be shifted to that sound. Any such accidental production should be exploited even if it is not the sound which the pupil is trying to make at the moment.

zh: Same as the *sh* except that vibration can be felt in the larynx.

ch: Tongue exercise 4 furnishes a good basis for the *ch.* The movement of the tongue should be rapid and the escape of the air explosive. The *ch* can also be taught as a combination of the *t* and the *sh.*

j: Same as the *ch* except that vibrations can be felt in the larynx.

k: Tongue exercises 7, 8, and 11 furnish the basis for the k.

g: Same as the *k* except that vibrations can be felt in the larynx.

l: Varying tongue exercise 3 by having the pupil raise the tip of his tongue to touch the roof of the mouth at the midline about as far back as the first pre-molars while saying the vowel ä produces an *l.*

r: An *r* can be approached successfully after the *l* is mastered by instructing the pupil to place his tongue as though he were going to

make an *l*, except for curling the tip of the tongue just a little farther back, and rather than touching the roof of the mouth as he does for the *l*, the tip does not quite reach the palate. If he has memory for hearing the *r* it is helpful for him to "think *r*" as he holds the tongue in that position and tries to say it.

PREVENTING SPEECH DETERIORATION

When a child has an average loss of 25 db. or more for frequencies 256, 512, 1024, 2048 and 4096, or a smaller loss which is known to be progressive, training should be initiated immediately to offset possible deterioration of the speech pattern, rather than waiting until a speech problem actually exists. It is much easier to maintain good speech than to correct it at a later date. Following are suggestions for proceeding with such a case.

1. At least two ten-minute periods should be set aside for speech practice during each week.

2. A part of each practice period should be devoted to building a speech reference chart such as the one given on page 97. Every item on this chart should be practiced during each lesson, even at the expense of boredom. Firmly fixing the values on the chart is the pupil's best insurance for retaining satisfactory speech and voice.

3. A part of each period should be used for oral reading during which the teacher listens carefully for the beginnings of possible deviations in the speech. The teacher should be critical of voice quality, volume, inflection, clarity of vowels and precision in consonantal articulation. When changes in the speech begin to show themselves, the teacher should discuss the undesirable qualities fully with the pupil while he still has memory for correct speech to use as a basis for comparison with the newly developed flaws.

4. Inflection and volume control are two very difficult things to teach an acoustically handicapped pupil. The exercises for voice quality listed on pages 97 and 99 should be given consistently, so that the child can develop a feeling for normal voice quality while he still has it.

5. Using the speech reference chart as a basis, the pupil should be given persistent drill in interpreting and using the pronunciation key in a standard dictionary.

APPENDIX

A. FORMS USED IN CONNECTION WITH THE HEARING PROGRAM

1. The Audiogram

AUDIOGRAM OF..... Age:....Grade:....Date:....194...

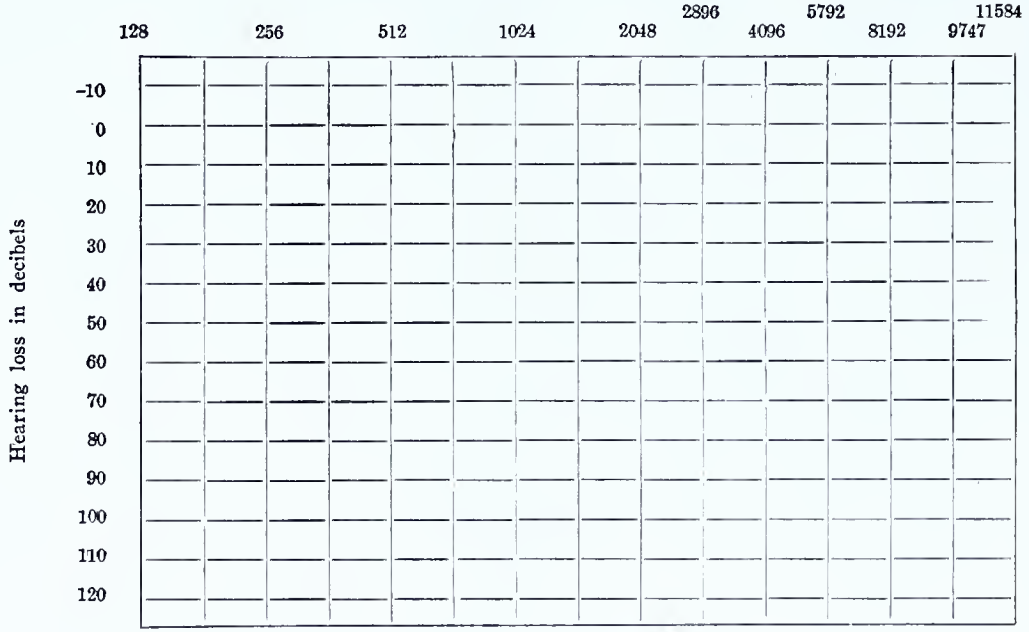
School.....

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF PUBLIC INSTRUCTION
Harrisburg

REMARKS:

RECORDER:----------

PISE 18
9-44



COMMONWEATH OF PENNSYLVANIA
DEPARTMENT OF PUBLIC INSTRUCTION
Division of Special Education
Harrisburg

2. AUDIOMETER TEST SHEET

NAME .....
AGE .....
GRADE .....
DATE .....

Do not make any noise as it will spoil the test.

INSTRUCTIONS

YOU WILL HEAR NUMBERS SPOKEN BY A PERSON WHO IS MOVING AWAY FROM YOU. THE VOICE WILL GET WEAKER AND WEAKER. LISTEN CAREFULLY AND WRITE AS MANY NUMBERS AS YOU CAN.

	Right Ear				Left Ear				
Hearing Score	1	2	3	4	5	6	7	8	Hearing Score
30									30
27									27
24									24
21									21
18									18
15									15
12									12
9									9
6									6
3									3
0									0
-3									-3
Hearing Score ----------					Hearing Score ----------				

Write a "yes" or 'no" in answer to the following questions:
Do you have a cold today ----------? Do you have a sore throat today ----------?
Do you have a running ear ----------?

PISE 10
9-44

Name _____ (last) (first) HEARING RECORD Birth date _____ (month) (day) (year)

Residence _____ Phone _____ School _____ District _____

Date	Test by	RIGHT EAR AIR CONDUCTION											LEFT EAR AIR CONDUCTION										
		128	256	512	1024	2048	2896	4096	5792	8192	11584	9747	128	256	512	1024	2048	2896	4096	5792	8192	11584	9747
		RIGHT EAR BONE CONDUCTION											LEFT EAR BONE CONDUCTION										

The Opposite Side of the Hearing Record

Test Date	Masking	Comments

COMMONWEATH OF PENNSYLVANIA
DEPARTMENT OF PUBLIC INSTRUCTION
Division of Special Education
Harrisburg

4. TEST RECORD AND FOLLOW-UP SHEET

School District County Examiner

No.	Name	age	grade	Test 1 R	Test 1 L	Test 2 R	Test 2 L	Test 3 R	Test 3 L	step 1	step 2	step 3	step 4	step 5	step 6
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															

Note: Indicate the progress in Follow-up Procedures by placing in the appropriate column numbers indicating the month and year when each step was taken.

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9-44

COMMONWEATH OF PENNSYLVANIA
DEPARTMENT OF PUBLIC INSTRUCTION
Division of Special Education
Harrisburg

AUDIOMETER PROGRAM
5. BULLETIN TO THE TEACHERS

1. Each teacher should be made aware of children in her class who have hearing impairments. She should be informed on the degree of hearing loss and she should be told whether one or both ears are affected.

2. Children whose scores on the hearing tests indicate a loss of nine (9) sound units in one or both ears are called to the attention of the teacher so she may make her own observations on whether or not the child is handicapped. After a period of observation she may not choose to show the child some of the considerations which are suggested below.

3. Children whose scores on the hearing tests indicate a hearing loss of twelve (12) sound units or more in one or both ears should be shown the considerations listed below, the degree of the hearing loss offering some index of the amount of special attention required from the teacher.

4. The hard-of-hearing child should be seated in the front row, preferably, a little off center on the side toward the windows. The front position will enable the child to hear the teacher's voice more easily, and he will at the same time be in a position to read lips more efficiently than he can from the distance.

5. If the child's hearing impairment involves only one ear, or if the impairment is definitely greater in one ear than it is in the other, seat the child in a front, corner seat so that his better ear is toward the class.

6. Give some attention to the hearing and posture of the hard-of-hearing child. Habits of extending the head and twisting the neck so as to turn the better ear toward a speaker become firmly fixed.

7. The child should be encouraged to watch the face of the teacher whenever she is talking to the class.

8. The teacher should try to face the hard-of-hearing child as much as possible when she is speaking to the class. She should try to give all important instructions from a position which is close to the child, attempting in as far as possible to avoid speaking from positions in which she finds herself between the windows and the child.

9. The teacher should avoid using loud tones or exaggerated lip movements in speaking to the hard-of-hearing child.

10. The hard-of-hearing child should be encouraged to turn and move about to see the faces of children who are reciting.

11. If a choice of teachers is possible, the hard-of-hearing child should be placed with a teacher who speaks slowly and precisely.

12. We are apt to over-estimate the hearing efficiency of the hard-of-hearing child, because when he is paying close attention he apparently hears quite well. It is to be remembered that this child is hearing at the expense of a greater effort than the normal child expends. It is to be expected that it will be difficult to hold the attention of the hard-of-hearing child for long periods of time.

13. A hearing loss which lasts over a period of time tends to result in a dull, monotonous voice and inaccurate diction. Therefore, the hard-of-hearing child should be encouraged to speak clearly. Keeping the child "speech-conscious" will help him to resist the usual damage which a hearing loss brings about in a voice.

14. Interest in music should be encouraged, especially participation in vocal music.

15. Since a hearing loss is a defect which affects the language processes, the child should be encouraged to compensate by a more active interest in all language activities: reading, grammar, spelling, original writing, etc.

16. The hard-of-hearing child should be drawn into active participation in all plays and other activities which involve speech.

17. The hard-of-hearing child should be watched carefully to be sure that he is not withdrawing from the group or that he is not suffering a personal reaction as the direct or indirect result of his hearing.

18. The nurses and teachers should be especially vigilant in noting common colds, flu, throat and nose infections, tonsilitis, running ears, etc., in the hard-of-hearing child. If at all possible, these conditions should be prevented. When they do occur, they should be cleared up as rapidly as possible.

19. All special considerations which are shown the hard-of-hearing child should be handled so as not to call unnecessary attention to the defect.

PISE 12
9-44

This is a suggestion for the content of the letter to the parents. It is assumed that many schools will revise this according to the particular details of their setup.

6. Letter to the Parents

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF PUBLIC INSTRUCTION
Division of Special Education
Harrisburg

Date .....

Dear Mr. and Mrs. .....:

The children of our public schools have been given hearing tests, and the results of .....'s test indicate that there probably is a hearing loss.

When discovered and treated early, many hearing impairments may be checked, whereas they often grow progressively worse if allowed to go on without treatment. It is, therefore, extremely important that you take your child to your family physician who will probably refer you to a competent ear specialist.

Sincerely yours

.....
Signature

PISE 13
9-44

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF PUBLIC INSTRUCTION
Division of Special Education
Harrisburg

AUDIOMETER PROGRAM
7. BULLETIN TO THE PARENTS

1. The responsibility for helping the hard-of-hearing child should not be left entirely to the school. A hearing loss is an "all-day" handicap, and it may well be that help given to the child out of school hours is of greater importance than the help given in the school.

2. It is hoped that this bulletin will not cause over-concern on the part of the parents. The suggestions it contains will probably be good for any child, whether he is hard-of-hearing or not, but they will prove to be of definite help to the child who has a loss. The amount of help necessary in the home will depend upon the degree of loss.

3. It is easy to misjudge the amount of hearing loss, because a child will often follow a simple conversation when he stands near the speaker, yet he may not hear well enough to understand a longer conversation including several people.

4. The child should be encouraged to watch the faces of people who speak to him. Help him to develop the habit of standing close to the speakers, and moving so that the light falls on the speakers' faces.

5. When speaking to the child, face him as often as possible, and move close to him.

6. Well-lighted rooms, especially dining and living rooms, will be helpful. At the table, seat the child so that he does not have to look directly at a glaring window or lamp behind you. When there are guests at the dining table, seat the child directly opposite the guests.

7. Draw the child into as much of the table conversation as possible, taking time to explain to him things which he may have missed.

8. It will be helpful to set aside a short period during the day when you seat the child before you and chat with him. This responsibility should be shared by all members of the family.

9. In talking with the child, avoid loud tones and exaggerated lip movements.

10. Over a period of time a hearing loss tends to result in dull, mumbling speech. It will be helpful to encourage careful speech.

11. The child with a hearing loss may become shy and backward because understanding others is hard. It is, therefore, necessary to encourage his joining in group activities. Urge him to play with other children and have other children come to your home.

12. The hard-of-hearing child frequently wants to have the radio played more loudly than other members of the family do. Allow him some time during which he may set the radio as loudly as he chooses. He may get some valuable training in this way.

13. It is essential for the parents to be frank in judging the whole situation—do not deny a loss when there is one, nor imagine a loss where there is none. If the loss has definitely been determined, talk it over frankly and without excitement with the child and others in the family. After that follow the suggestions given without continually reminding the child of his handicap.

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9-44

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF PUBLIC INSTRUCTION
Division of Special Education
Harrisburg

8. REPORT ON AUDIOMETER TESTS
SUMMARY SHEET

School .....

School District ..... Submitted by .....

County ..... Official Position .....

Date ..... Address .....

Place a check in the proper space to indicate which testing technic was used:
Multiple Audiometer..... Discrete Frequency Threshold Test..... Discrete Frequency Screening Test.....

Grades	1	2	3	4	5	6	7	8	9	10	11	12	Total
1. Number of pupils receiving 1st test													
2. Number of pupils receiving 2nd test													
3. Number of pupils receiving 3rd test													
4. Number of pupils in item 3 showing a loss of 9 units or more by the Multiple Audiometer Test													
5. Number of pupils showing critical losses either by a screening test or by a threshold test with the discrete frequency audiometer													
6. Number of pupils in items 4 and 5 who are making unsatisfactory school adjustments													

Note: Persons using the phonographic, multiple audiometer will fill in items 1, 2, 3, 4 and 6.

PISE 16
9-44

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF PUBLIC INSTRUCTION
Division of Special Education
Harrisburg

9. REPORT OF FOLLOW-UP ON HEARING CASES

School .....
School District .....
County .....

Date .....
Submitted by .....
Position .....
Address .....

Record of Folow-up Procedures:

Step 1. Number of children whose teachers were furnished with copies of the Bulletin to Teachers ..... ____

Step 2. Number of children whose parents were contacted:
- a. Number of children whose parents received a form letter ..... ____
- b. Number of children whose parents were contacted by home visits ..... ____
- c. Number of children whose parents were given copies of the Bulletin to The Parents ..... ____

Step 3. Number of children who were given special examination by the school's medical examiner ..... ____

Step 4. Number of children for whom the families arranged medical examination and/or treatment ..... ____

Step 5. Number of children referred to hearing clinics ..... ____

Step 6. Number of children referred for educational and/or psychological study ..... ____

Step 7. Number of children who were referred to educational clinics or supervisors of special education for further recommendations for educational adjustment ..... ____

Record of Disposition Cases:

Number receiving medical attention ..... ____
Number being given special consideration by classroom teacher ..... ____
Number receiving training in lip reading ..... ____
Number receiving speech training ..... ____
Number fitted with hearing aids ..... ____
Number placed in special classes for acoustically handicapped children ..... ____
Number placed in residential schools ..... ____

A copy of this sheet should be submitted to the Superintendent of Schools. A second copy should be forwarded to the Division of Special Education in the Department of Public Instruction.

PISE 17
9-44

B. KEY FOR RECORDS KS-6090

RIGHT EAR					LEFT EAR			
Column No. 1	Column No. 2	Column No. 3	Column No. 4	Hearing Score	Column No. 5	Column No. 6	Column No. 7	Column No. 8
526	538	863	646	30	463	853	541	466
348	363	224	662	27	525	436	285	868
414	318	546	648	24	624	841	115	543
111	868	288	624	21	432	218	821	225
648	338	883	331	18	856	444	118	262
526	182	416	462	15	416	483	662	444
826	548	813	452	12	688	441	431	622
363	351	345	126	9	466	183	284	445
528	341	588	831	6	844	238	431	388
634	588	133	833	3	338	661	123	642
124	565	461	554	0	641	488	822	816
858	134	165	636	-3	166	463	238	531

C. KEY FOR RECORDS KS-6091

RIGHT EAR					LEFT EAR			
Column No. 1	Column No. 2	Column No. 3	Column No. 4	Hearing Score	Column No. 5	Column No. 6	Column No. 7	Column No. 8
54	56	85	64	30	48	55	48	38
41	68	83	46	27	23	54	63	43
84	63	42	42	24	66	88	83	52
51	13	18	82	21	41	42	32	51
18	34	61	21	18	81	23	85	22
23	12	35	15	15	68	85	63	56
22	31	32	35	12	21	86	18	65
11	63	44	46	9	15	64	24	25
48	88	53	41	6	43	58	88	16
38	81	66	53	3	31	38	25	84
66	26	22	52	0	24	18	62	32
51	12	45	84	-3	56	23	32	64

D. KEY FOR RECORD KS-10087

RIGHT EAR					LEFT EAR			
Column No. 1	Column No. 2	Column No. 3	Column No. 4	Hearing Score	Column No. 5	Column No. 6	Column No. 7	Column No. 8
42	22	34	41	30	65	55	43	11
32	24	86	56	27	68	32	55	42
41	55	85	44	24	56	58	56	41
86	34	41	24	21	23	68	68	85
58	23	65	58	18	42	65	14	22
23	85	68	22	15	22	44	65	65
65	86	11	85	12	14	32	58	23
14	56	56	23	9	58	86	41	58
56	41	32	86	6	85	14	32	86
85	65	23	43	3	41	56	85	32
23	58	14	65	0	32	23	86	56
68	32	58	14	–3	86	58	23	14

E. REGIONAL OFFICES OF THE STATE BUREAU OF REHABILITATION

Location of District Office	*Counties Covered*	
ALTOONA, PENNSYLVANIA 208 Commerce Building	Bedford Blair Cambria	Fulton Huntingdon Somerset
DUBOIS, PENNSYLVANIA Deposit National Bank Building	Cameron Center Clearfield Clinton Elk	Jefferson Lycoming McKean Potter Tioga
ERIE, PENNSYLVANIA 507 Ariel Building	Clarion Crawford Erie Forest	Mercer Venango Warren
HARRISBURG, PENNSYLVANIA 311 Ebner Building 2nd and Locust Streets	Adams Cumberland Dauphin Franklin Juniata Lancaster Lebanon	Mifflin Northumberland Perry Snyder Union York

PHILADELPHIA, PENNSYLVANIA Keystone Building 261 N. Broad Street	Bucks Chester Delaware	Montgomery Philadelphia
PITTSBURGH, PENNSYLVANIA House Building 4 Smithfield Street	Allegheny Armstrong Beaver Butler Fayette	Green Indiana Lawrence Washington Westmoreland
READING, PENNSYLVANIA 301 Berks County Trust Building 35 N. Sixth Street	Berks Carbon Lehigh	Northampton Schuylkill
WILKES-BARRE, PENNSYLVANIA 1106 Deposit & Savings Bank Building	Bradford Columbia Lackawanna Luzerne Monroe Montour	Pike Sullivan Susquehanna Wayne Wyoming

F. LIST OF PSYCHOLOGICAL CLINICS APPROVED BY THE STATE COUNCIL OF EDUCATION

Allentown State Hospital and branches, Allentown.

Bloomsburg State Teachers College Psycho-Educational Clinic, Bloomsburg.

California State Teachers College Mental Clinic, California.

Danville State Hospital and branches.

Indiana State Teachers College Psycho-Educational Bureau, Indiana.

Mansfield State Teachers College Psycho-Educational Clinic, Mansfield.

Institute of the Pennsylvania Hospital, Philadelphia.

Marywood College Psycho-Educational Clinic, Scranton.

Norristown State Hospital and branches, Norristown.

The Pennsylvania State College Psycho-Educational Clinic, State College.

Pittsburgh Child Guidance Center, Pittsburgh.

Slippery Rock State Teachers College Mental Clinic, Slippery Rock.

Temple University Psychological Clinic, Philadelphia.

Torrance State Hospital and branches, Torrance.

University of Pennsylvania Psychological Clinic, Philadelphia.

University of Pittsburgh Psychological Clinic, Pittsburgh.

VanMeter Child Study Center, Elkins Park.

Warren State Hospital and branches.

West Chester State Teachers College Psycho-Educational Clinic, West Chester.

G. LIST OF GROSS SOUNDS FOR USE IN TRAINING RESIDUAL HEARING*

1. An Assortment of Horns With Different Pitches and Tonal Qualities
2. Assorted Bells
3. Automobile Horn
4. A Variety of Whistles
5. Baby Cry
6. Bicycle Siren
7. Boat Whistle
8. Castinets
9. Chimes
10. Chinese Cymbal
11. Chinese Gong
12. Chinese Wood Block
13. Claves
14. Closing or Slamming Doors
15. Cow Bawl
16. Cuckoo Whistle
17. Cymbal
18. Drum
19. Duck Quack
20. Hen Cackle
21. Imitation of Horses' Hoof Beats
22. Jingle Sticks
23. Klit Klat
24. Locomotive and Bell Imitation
25. Maracas
26. Metal Crickets
27. Notes or Chords Played on a Piano
28. Quail Whistle
29. Rooster Crow
30. Sand Blocks
31. Sheets of Metal of Various Sizes Which Can Be Struck With a Mallet
32. Slap Sticks
33. Snappers
34. Tambourines
35. Tom Tom
36. Train Whistle
37. Triangles
38. Typewriter
39. Wire Brushes To Be Used With Drums
40. Wood Ratchet
41. Xylophone

* Many of the names used in the above list are those found in catalogs of companies which sell musical instruments. Since most of the listed articles are used as sound affects for orchestras they can be purchased through dealers in musical instruments.

H. SUGGESTED LIST OF PHONOGRAPH RECORDS FOR TRAINING RESIDUAL HEARING

Rhythms				
Used with musical score		22761	A and B	Victor
		20350	A and B	Victor
		20351	A and B	Victor
Used with rhythm sticks	2	2276	B	Victor
	1	20350	(both sides)	Victor
	1	20351	A	Victor
Mother Goose Rhymes				
		20743	A and B	Victor
		20212	A and B	Victor
		22133	A and B	Victor
		22134	A and B	Victor
Songs for Children				
Individual Records		19831		Victor
		20442		Victor
		20212		Victor
		20213		Victor
		20743		Victor
Album of Songs		20073	A and B	Victor
Games				
		22760	A and B	Victor
		22761	A and B	Victor
Ditties to Dramatize				
Beans Porridge		22761	A	Victor
Jolly Coppersmith		20318	A	Victor
Little Lead Soldiers		19750		Victor
Lullaby		20174	A	Victor
Rhythm for Running		20162	A	Victor
Rhythm for Skating		20401	A	Victor
Rhythm for Skipping		20526	B	Victor
Rhythm for Skipping		20736	B	Victor
Musical Instruments				
Bugle Calls		21494		Victor
Castanets		22169	B	Victor
Organ		20298	B	Victor
Orchestral Instruments		20522	A and B	Victor
Orchestral Instruments		20523	A and B	Victor

Stories			
Chicken Little	35853	A	Victor
Goldilocks and the Three Bears	2607	A	Decca
Goldilocks and the Three Bears	35853	B	Victor
Fairy Tales		BC-4	Blue Bird
Little Black Sambo		BC-6	Blue Bird
Noah's Ark	24439	B	Victor
Snow White		J. B.	Blue Bird
Songs of the Zoo		BC-44	Blue Bird
The Little Red Hen	20944	B	Victor
Three Billy Goats Gruff	20944	B	Victor
Miscellaneous			
Animal Sounds	24439	A	Victor
Animal Sounds	20344	A and B	Victor
El Capitan (March)	20191	B	Victor
Grasshopper Dance	495	A	Decca
Military March	20526	B	Victor
Waltz	20177	A	Decca
Whistling	19869	A	Victor

Commonwealth of Pennsylvania

Department of Public Instruction

Teacher Education and Certification

Harrisburg

I. REGULATIONS FOR CERTIFICATION OF TEACHERS OF CLASSES FOR THE DEAF

The regulations for certification of teachers of classes for the deaf and the hard-of-hearing should be obtained by writing to Teachers Education and Certification, Department of Public Instruction.

Commonwealth of Pennsylvania

Department of Public Instruction

Teacher Education and Certification

Harrisburg

J. REGULATIONS FOR CERTIFICATION OF SPEECH CORRECTIONISTS

A certificate of standard grade may be validated for the services of a "Speech Correctionist" on the completion of twenty-four semester hours of approved courses in speech correction in accordance with the following distribution:

1. *Courses Basic to All Special Class Certification*

6 sem. hrs.

*Psychology or Education of Exceptional Children
Diagnostic Testing and Remedial Teaching
†Mental Hygiene

2. *Courses Definitely Applicable to the Practice of Speech Correction*

9 sem. hrs.

*Speech Problems
†Speech Pathology
*Speech Clinic (including clinical practice)
†Special Methods in Speech Correction
Psychology of Speech
Phonetics

3. *Speech Correction Electives*

9 sem. hrs.

†Speech Clinic (advanced)
†Mental Tests (individual)
Clinic Psychology
Voice and Diction
Mental Tests (group)

Any excess in groups one or two may be applied to group three.

In institutions approved for the education of "Speech Correctionists," students pursuing the four-year elementary curriculum may elect speech correction as outlined above and omit specialization in kindergarten-primary, intermediate, or rural education.

April 27, 1943

K. GLOSSARY

Acuity. Acuity is sensitivity. Thus hearing acuity is the sensitivity of the hearing.

Air Conduction Receiver. The air conduction receiver is a receiver which is held over the ear during its use. The sound coming from the receiver is conducted through the air in the external ear canal to the ear-drum.

Air Conduction Test. The air conduction test is a test of hearing acuity in which the test tones are introduced to the outer ear by an air conduction receiver. The tone travels through the air in the external ear canal until it reaches the ear-drum whence it travels to the cochlea via the ossicular chain.

Audiometer. The audiometer is a precision instrument for measuring hearing acuity.

Auricular Training. Auricular training is the training of the use of residual hearing. Such training cannot increase the residual hearing but it does enable a person to make better use of it.

*Must be selected within these groups.
†Preferred.

Bilateral Impairment. A bilateral hearing impairment is one which affects both ears.

Bone Conduction Receiver. A bone conduction receiver is held against the skull, usually at the mastoid, during its use. The sound energy is conducted through the bone to the cochlea.

Bone Conduction Test. The bone conduction test is a test of hearing in which the test tones are carried through the skull to reach the cochlea. A special bone conduction receiver which is applied to the mastoid bone is used in this test.

Cochlea. The cochlea, which is shaped like a snail shell, is the division of the inner ear which contains the nerve endings which are stimulated by sound energy. The sound energy reaches the auditory nerve in the cochlea.

Conductive Deafness. A conductive deafness results from an impairment of the conductive mechanism, viz., the external canal of the ear, the ear-drum and the ossicles in the middle ear.

Decibel. The decibel is a unit of sound energy. A change of sound energy of one decibel is approximately the smallest change which the human ear can detect. The decibel is a logarithmic unit.

Discrete Frequency Test. The discrete frequency test of hearing is a test made with a discrete frequency audiometer. The discrete frequency test usually refers to a careful threshold test by which the lowest intensity at which a subject can hear tones of particular frequencies is determined.

External Canal of the Ear. The external canal of the ear is the opening in the outer ear which leads in to the ear-drum.

External Ear. The external ear is the outer portion of the ear, including the auricle or earlobe and the canal, which is obstructed by the ear-drum.

Frequency. In this bulletin frequency is used in connection with pure tones or tones which are nearly pure. The frequency of a pure tone is an exact measure of the number of pulsations or vibrations per second making up the tone.

Group Audiometer. The group audiometer is an instrument by which the hearing acuity of groups of persons can be measured at one time. It is usually a phonograph audiometer.

Individual Audiometer. An individual audiometer is an instrument with which the hearing of only one person can be measured at one time.

Intensity. Intensity is the exact measure of the amount of energy in a sound.

Internal Ear. The internal ear is the innermost portion of the ear. The semi-circular canals, which are concerned with balance, and the cochlea, in which sound energy stimulates the hearing nerve, are divisions of the inner ear.

Interrupter. The interrupter is a switch by which the test tones can be cut off or stopped.

Masking. Masking is the process of introducing one sound to prevent the perception of another sound.

Masking Tone. A masking tone is a tone which is introduced into an ear, usually the better ear, in order to prevent it from perceiving a tone which is being used in testing the poorer ear.

Middle Ear. The middle ear consists of the cavity between the ear-drum and the inner ear. The chain of ossicles crosses the middle ear, conducting sound from the drum to the cochlea.

Monitor Method. The monitor method is a method by which children who cannot respond satisfactorily to the usual group audiometric procedure because of immaturity, crippling conditions or other reasons, can be tested individually. Using this method, the children whisper the number or words they hear instead of writing them.

Multiple Audiometer. The same as the group audiometer.

Nerve Deafness. The same as perceptive deafness.

Ossicles. The ossicles are the three small bones of the middle ear. They form a bony chain over which the sound energy passes in going from the ear-drum to the cochlea.

Panel of the Audiometer. The panel of the audiometer is the surface of the equipment on which the dials and parts essential to its operation are located.

Perceptive Deafness. Perceptive deafness results from an impairment of the auditory nerve.

Phonograph Audiometer. The phonograph audiometer is an instrument by which hearing is tested through the use of tones, words or sentences which are recorded on phonograph records.

Pure Tone. A pure tone is sound resulting from vibrations at one particular frequency. The pure tone has no accompanying harmonics or over-tones.

Residual Hearing. Residual hearing is the reduced hearing which remains with a person who has a hearing impairment.

Screening Test. A screening test is a rapid test by which individuals with hearing impairments may be selected from a large group of people.

Sound Field Test. The sound field test is a test of hearing acuity by which the efficiency of hearing is gauged by the ability of a person to hear tones or speech which is introduced into a room through a loud-speaker.

Speech Test. The speech test of hearing acuity is a test by which the efficiency of hearing is determined from the lowest intensity level at which speech can be presented and the subject still hear it. Words, syllables or sentences may be used in a speech test.

Threshold. The threshold of hearing is the lowest intensity level at which an ear perceives a sound.

Threshold Test. The threshold test on a discrete frequency audiometer is a test in which the threshold for each ear for the various test tones is determined.

Unilateral Impairment. A unilateral hearing impairment is one which affects only one ear.

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